T.C.
HATAY MUSTAFA KEMAL ÜNİVERSİTESİ
FEN BİLİMLERİ ENSTİTÜSÜ

CONFORMABLE KESİRLİ MERTEBEDEN KISMİ DİFERANSİYEL DENKLEMLERİN TAM ÇÖZÜMLERİ

Derya UĞUN

ENFORMATİK ANABİLİM DALI

YÜKSEK LİSANS TEZİ

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TEZ BİLDİRİMİ

Tez içindeki bütün bilgilerin etik davranış ve akademik kurallar çerçevesinde elde edilerek sunulduğunu, tez yazım kurallarına uygun olarak hazırlanan bu çalışmada bana ait olmayan her türlü ifade ve bilginin kaynağına eksiksiz atıf yapıldığını ve tez üzerinde Yükseköğretim Kurulu tarafından hiçbir değişiklik yapılamayacağı için tezin bilgisayar ekranında görüntülendiğinde asıl nüsha ile aynı olması sorumluluğunun tarafıma ait olduğunu beyan ederim.

Derya UĞUN

ÖZET

CONFORMABLE KESİRLİ MERTEBEDEN KISMİ DİFERANSİYEL DENKLEMLERİN TAM ÇÖZÜMLERİ

Beş bölümden oluşan tezin giriş bölümünde kesirli türev ile ilgili literatürdeki çalışmalara yer verildi. İkinci bölümde, conformable kesirli türev ve $e^{-\phi(\xi)}$ yöntemi ile yapılan çalışmalara yer verildi. Üçüncü bölümde, conformable türev yaklaşımının tanımı ve özellikleri verildikten sonra $e^{-\phi(\xi)}$ yöntemine yer verildi. Tezin orijinal kısmı olan dördüncü bölümde ise kesirli mertebenden Boussinesq-Double Sinh-Gordon, yeni ikili Mkdv, genelleştirilmiş Rosenau-Kawahara-RLW denklemlerinin $e^{-\phi(\xi)}$ yöntemi kullanılarak tam çözümleri elde edildi. Beşinci bölümde ise sonuç ve önerilere yer verildi.

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Anahtar Kelimeler: $e^{-\phi(\xi)}$ Yöntemi, Tam çözüm, Kesirli mertebeden Boussinesq-Double Sinh-Gordon denklemi, Kesirli mertebeden yeni ikili Mkdv denklemi, Kesirli mertebeden genelleştirilmiş Rosenau-Kawahara-RLW denklemi.

ABSTRACT

EXACT SOLUTIONS of CONFORMABLE FRACTIONAL ORDER PARTIAL DIFFERENTIAL EQUATIONS

In the introduction part of the thesis, which consists of five chapters, studies in the literature on fractional derivatives are included. In the second part, studies with conformable fractional derivative and $e^{-\phi(\xi)}$ method are given. In the third chapter, after the definition and properties of the conformable derivative approach are given, the $e^{-\phi(\xi)}$method is given. In the fourth chapter, which is the original part of the thesis, exact solutions of the fractional order Boussinesq-Double Sinh-Gordon, new coupled Mkdv, generalized Rosenau-Kawahara-RLW equations are obtained using the $e^{-\phi(\xi)}$method. In the fifth chapter, conclusions and recommendations are given.

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Keywords: $e^{-\phi(\xi)}$ method, Exact solution, Fractional order Boussinesq-Double Sinh-Gordon equation, Fractional order new coupled Mkdv equation, Fractional order generalized Rosenau-Kawahara-RLW equation.

TEŞEKKÜR

Öncelikle danışmanlığımı üstlenen ve tez çalışmamın yürütülmesi sürecinde anlayış ve sabırla yol gösterip cesaretlendiren, bilgilerini aktaran ve öğrencisi olmaktan daima gurur duyacağım kıymetli hocam Doç. Dr. Orkun TAŞBOZAN'a teşekkürü borç bilirim.

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İÇİNDEKİLER

1. GİRİŞ

Son birkaç yılda, lineer olmayan diferansiyel denklemlerdeki ilgi odağı lineer olmayan kesirli diferansiyel denklemlerin analitik çözümlerinin elde edilmesi oldu. Bu tür lineer olmayan kesirli diferansiyel denklemlerin çözümlerini elde etmek için birçok matematikçi ve fizikçi farklı yöntemler geliştirdi (Zulfiqar ve Ahmad, 2021). Literatürde, üstel fonksiyon yöntemi (He,1999; Zulfiqar ve Ahmad, 2020), varyasyonel iterasyon yöntemi (Zulfiqar ve Ahmad,2020), sinüs-kosinüs yöntemi (Wazwaz, 2004), (G'/G)-açılım yöntemi (Akbar ve ark., 2019), Adomian ayrıştırma yöntemi (Wazwaz, 2005), deneme denklemi yöntemi (Liu, 2019), kesirli alt denklem (Bo ve ark. 2012), F genişletme yöntemi (Pandir ve Duzgun, 2017) gibi çok sayıda yöntem yer almaktadır.

Kesirli diferansiyel denklemlerde kullanılan birçok kesirli türev yaklaşımı mevcuttur. Bu yaklaşımlardan, kolay tanımından dolayı tamsayı mertebeden türev ile ifade edilebilen ve temel matematikte yer alan türev formüllerini sağlayan conformable kesirli türev yaklaşımı daha çok tercih edilmektedir (Khalil ve ark., 2014). Bu tezde ele alınan kesirli mertebeden diferansiyel denklemlerde bulunan kesirli türevler conformable kesirli türev olarak alındı.

Bu tezde, zaman değişkenine göre conformable anlamında kesirli mertebeden türev içeren Boussinesq-Double Sinh-Gordon, yeni ikili Mkdv ve genelleştirilmiş Rosenau-Kawahara-RLW denklemlerinin analitik çözümleri $e^{-\phi(\xi)}$ yöntemi ile elde edildi.

Bu denklemlerden Boussinesq-Double Sinh-Gordon denklemi birçok araştırmacı tarafından çeşitli analitik yöntemler kullanılarak çözüldü. 2005 yılında A.M. Wazwaz tanjant hiperbolik yöntemini kullanarak Boussinesq-Double Sinh-Gordon denkleminin analitik çözümlerini elde etti (Wazwaz, 2005). 2006 yılında Abdul-Majid Wazwaz, değişkenlerine ayırma yöntemini kullanarak Boussinesq-Double Sinh-Gordon denkleminin analitik çözümünü buldu (Wazwaz, 2006). 2012 yılında, G. Ebadi ve arkadaşları, (G'/G)-açılım yöntemini kullanarak Boussinesq-Double Sinh-Gordon denkleminin analitik çözümlerini elde ettiler (Ebadi ve ark., 2012). 2013 yılında A. Esen ve arkadaşları üstel fonksiyon yöntemin yardımıyla Boussinesq-Double Sinh-Gordon denkleminin analitik çözümlerini elde ettiler (Esen ve ark., 2013). 2019 yılında S. Yılmaz ve O. Tasbozan yardımcı denklem yöntemini kullanarak Boussinesq-Double Sinh-Gordon denkleminin analitik çözümlerini buldular (Yılmaz ve Tasbozan, 2020).

Yeni ikili Mkdv denkleminin farklı tiplerinin çözümleri ise genişletilmiş tanjant hiperbolik (Fan, 2001), trigonometrik fonksiyon dönüşüm (Cao ve ark., 2002), yeni iteratif (Sontakke ve ark., 2018), alt denklem (Martínez ve Aguilar, 2019) yöntemlerini kullanarak elde ettiler.

Genelleştirilmiş Rosenau-Kawahara-RLW denklemi, sonlu faklar yöntemi ile Dongdong He ve Kejia Pan tarafından 2015 yılında (He ve Pan, 2015), Jin-ming Zuo sech ve tanh yöntemi ile 2015 yılında (Zuo, 2015), 2018 yılında Tao Chen ve arkadaşları tarafından yeni bir lineer fark yaklaşımı ile (Chen ve ark , 2018) , Xiaofeng Wang ve Weizong Dai açık sonlu fark yaklaşımını kullanarak 2018 yılında (Wang ve Dai ,2018), Turgut Ak ve arkadaşları B-spline kollokasyon yöntemi ile 2018 yılında (Ak ve ark., 2018) ve Ahlem Ghiloufi ve arkadaşları da 2019 yılında lineer olmayan sonlu fark yaklaşımını kullanarak nümerik çözümlerini elde ettiler (Ghiloufi ve ark., 2019).

2. ÖNCEKİ ÇALIŞMALAR

2014 yılında Harun-Or-Roshid ve Md. Azizur Rahman tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi, (1+1) boyutlu Boussinesq denklemine uygulanarak analitik çözümleri elde edildi (Roshid ve Rahman, 2014).

Kamruzzaman Khan ve M. Ali Akbar, $e^{-\phi(\xi)}$ yöntemini kullanarak Vakhnenko–Parkes denkleminin analitik çözümleri 2014 yılında elde ettiler (Khan ve Akbar, 2014).

Aynı yılda yapılan bir diğer çalışmada ise Mahmoud A.E.Abdelrahman ve arkadaşları lineer olmayan Burger ve Schrodinger denklemlerinin analitik çözümlerini $e^{-\phi(\xi)}$ yöntemi yardımıyla buldular (Abdelrahman ve ark., 2014).

2014 yılında yapılan başka bir çalışmada M.Ali Akbar ve Norhashidah Hj Mohd Ali $e^{-\phi(\xi)}$ yöntemi ile dördüncü dereceden Boussinesq denkleminin analitik çözümleri elde ettiler (Akbar ve Ali, 2014).

2014 yılında Nizhum Rahman ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi Shorma-Tasso-Olver denklemine uygulanarak analitik çözümleri elde ettiler (Rahman ve ark., 2014).

2015 yılında Mahmoud A. E. Abdelrahman ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi yeni bir DNA modelinin dinamik ve av-avcı sistemlerine uygulanarak analitik çözümleri elde edildi (Abdelrahman ve ark., 2015).

2015 yılında S. M. Rayhanul Islam tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi uygulanarak Benney-Luke denkleminin analitik çözümleri elde edildi (Islam, 2015).

2015 yılında S. M. Rayhanul Islam ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi uygulanarak Gardner ve birleştirilmiş KdV-mKdV denklemlerinin analitik çözümleri elde edildi (Islam ve ark., 2015).

2015 yılında Harun-Or-Roshid ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi uygulanarak basitleştirilmiş MCH denkleminin analitik çözümlerini elde ettiler (Roshid ve ark., 2015).

2015 yılında Emad H. M. Zahran tarafından yapılan çalışmada biyomatematik alanındaki denkleme $e^{-\phi(\xi)}$ yöntemi uygulanarak analitik çözümler elde edilmiştir (Zahran, 2015).

2015 yılında Emad H. Zahran ve Mostafa M.A.Khater tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi uygulanarak yeni bir lineer olamayan dinamik sistemine ve Kundu-

Eckhaus denklemine uygulanarak analitik çözümler elde edilmiştir (Zahran ve Khater, 2015).

2015 yılında M.G. Hafez ve M.A. Akbar tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi ikili Klein-Gordon-Zakharov denklemine uygulanarak analitik çözümler elde edilmiştir (Hafez ve Akbar, 2015).

2015 yılında M.N.Alam ve arkadaşları tarafından yapılan çalışmada , (2+1)-dimensional Boussinesq denklemine, $e^{-\phi(\xi)}$ yöntemi uygulanarak analitik çözümler elde edilmiştir (Alam ve ark., 2015).

2015 yılında Mahmoud A.E.Abdelrahman ve Mostafa M.A.Khater tarafından yapılan çalışmada Fitzhugh-Nagumo ve modifiye edilmiş Liouville denklemlerine $e^{-\phi(\xi)}$ yöntemini uygulayarak analitik çözümler elde edilmiştir (Abdelrahman ve Khater, 2015).

Aynı yıl içinde, M.G. Hafez ve arkadaşları tarafından yapılan başka bir çalışmada $e^{-\phi(\xi)}$ yöntemi ikili Higgs denklemi ve Maccari sistemine uygulayarak analitik çözümleri elde ettiler (Hafez ve ark., 2015).

2016 yılında Mostafa M.A. Khater tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi, genelleştirilmiş Hirota-Satsuma ikili KdV denklemine uygulanarak analitik çözümleri elde etti (Khater, 2016).

2016 yılında Nur Alam ve Fethi Bin Muhammad Belgacem tarafından yapılan çalışmada biyomatematikte kullanılan lineer olmayan modelin analitik çözümlerini $e^{-\phi(\xi)}$ yöntemi yardımı ile elde ettiler (Alam ve Belgacem, 2016).

2016 yılında, M.G. Hafez tarafından yapılan çalışmada, (3+1)-boyutlu ikili Klein–(Hafez,2016).

2016 yılında Melike Kaplan ve Ahmet Bekir tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi kesirli mertebeden Sharma–Tasso–Olver ve (3+1) boyutlu kesirli mertebeden KdV–Zakharov-Kuznetsov denklemlerine uygulanarak analitik çözümleri elde edilmiştir (Kaplan ve Bekir, 2016).

2016 yılında M.Y. Ali ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi kullanarak beşinci mertebeden Sawada-Kotera denkleminin analitik çözümlerini elde ettiler (Ali ve ark., 2016).

2017 yılında Nematollah Kadkhodaa, Hossein Jafari tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi uygulanarak Gerdjikov–Ivanov denkleminin analitik çözümleri başarılı bir şekilde bulundu (Kadkhodaa ve Jafari, 2017).

2017 yılında Ekici ve arkadaşları tarafından yapılan diğer bir çalışmada ise $e^{-\phi(\xi)}$ yöntemi lineer olmayan ikili Schröndinger denklemine uygulanarak analitik çözümleri elde edilmiştir (Ekici ve ark., 2017).

2017 yılında Yadong Wang ve Xindong Zhang, $e^{-\phi(\xi)}$ yöntemini kullanarak (3+1)-dimensional Korteweg-de Vries Zakharov Kuznetsov denkleminin analitik çözümlerini buldular (Wang ve Zhang, 2017).

2017 yılında Aly R. Seadawy ve arkadaşları $e^{-\phi(\xi)}$ yöntemini kullanarak genelleştirilmiş Zakharov–Kuznetsov–Benjamin–Bona–Mahony denkleminin analitik çözümlerini buldular (Seadawy ve ark., 2017).

2017 yılında diğer bir çalışmada K. Hosseinia ve arkadaşları ,Tzitzéica tipindeki denklemlerden olan Tzitzéica ve Tzitzéica- Dodd–Bullough–Mikhailov denklemlerine $e^{-\phi(\xi)}$ yöntemi uygulayarak analitik çözümleri elde ettiler (Hosseinia ve ark., 2017).

2017 yılında Arzu Akbulut ve arkadaşları $e^{-\phi(\xi)}$ yöntemini Zakharov Kuznetsov–Benjamin Bona Mahony (ZK-BBM) ve Boussinesq denklemlerine uygulayarak, analitik çözümleri elde ettiler (Akbulut ve ark., 2017).

M. Mashiur Rahhman ve arkadaşları 2018 yılında $e^{-\phi(\xi)}$ yönteminin ikili Boussineq denklemi, (2+1) boyutlu Boussinesq ve Kadomtsev- Petviashili (BKP) denklemlerine uygulanmasıyla bu denklemlerin analitik çözümlerini elde etmişlerdi (Rahhman ve ark., 2018).

Saima Arshed ve arkadaşlarının 2018 yılında yaptıkları çalışmada $e^{-\phi(\xi)}$ yöntemi uygulanarak Kundu–Eckhaus denkleminin analitik çözümlerini elde ettiler (Arshed ve ark., 2018).

Hong-Zhun Liu tarafından 2018 yılında yapılan çalışmada $e^{-\phi(\xi)}$ yöntemini kullanarak Gerdjikov–Ivanov denkleminin analitik çözümlerini buldu (Liu, 2018).

Saima Arshed ve arkadaşları tarafından 2018 yılında yapılan başka bir çalışmada $e^{-\phi(\xi)}$ yöntemi ,lineer olmayan Schröndinger denklemine uygulanarak analitik çözümler elde edildi (Arshed ve ark., 2018).

Dipankar Kumar ve Samir Chandra Ray, 2019 yılında yaptıkları çalışmada $e^{-\phi(\xi)}$ yöntemini uygulayarak kesirli meretebeden CRWP, değiştirilmiş Kawahara ve BBM-Burger denklemlerinin analitik çözümlerini elde ettiler (Kumar ve Ray, 2019).

2019 yılında Saima Arshed tarafından yapılan çalışmada $e^{-\phi(\xi)}$ ve birinci integral yöntemlerini kullanarak Triki–Biswas denkleminin analitik çözümlerini elde etti (Arshed, 2019).

2019 yılında, (2+1) boyutlu genişletilmiş Zakharov–Kuzetsov evolution denkleminin analitik çözümleri, F. Ferdous ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi uygulanarak elde edilmiştir (Ferdous ve ark.,2019).

2019 yılında Saima Arshed ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi ile Fokas-Lenells denkleminin analitik çözümleri elde edilmiştir (Arshed ve ark., 2019).

2020 yılında Pallavi Verma ve Lakhveer Kaur $e^{-\phi(\xi)}$ yöntemi ile genelleştirilmiş breaking soliton denkleminin analitik çözümlerini elde edilmiştir (Verma ve Kaur , 2020).

2020 yılında Alaaeddin Amın Moussa ve Lama Abdulaziz Alhakim tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi ile Whitham–Broer–Kaup ve Hirota–Satsuma coupled KdV denklemlerinin analitik çözümleri elde edilmiştir (Moussa ve Alhakim,2020).

2020 yılında Saima Arshed $e^{-\phi(\xi)}$ yöntemini lineer olmayan Schröndinger denklemine uygulayarak bu denklemin analitik çözümlerini elde etti (Arshed, 2020).

Riadh Hedli ve Abdelouahab Kadem tarafından 2020 yılında yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi kullanılarak beşinci mertebeden Korteweg-de Vries denkleminin analitik çözümlerini elde ettiler (Hedli ve Kadem , 2020).

2020 yılında Nur Hasan Mahmud Shahen ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi kullanılarak (2+1) boyutlu Ablowitz-Kaup-Newell-Segur denkleminin analitik çözümleri başarı ile bulundu (Shahen ve ark.,2020).

2021 yılında Saima Arshed ve arkadaşları tarafından yapılan çalışmada Sine-Gordon genişletilmiş, $e^{-\phi(\xi)}$ ve birinci integral yöntemlerini kullanarak genelleştirilmiş Davey-Stewartson denkleminin analitik çözümleri elde edilmiştir (Arshed ve ark., 2021).

2021 yılında, Radhadkrishnan-Kundu-Lakshmanan denkleminin analitik çözümleri Rawipa Yangchareonyuanyong ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi ile elde edilmiştir (Yangchareonyuanyong ve ark., 2021).

2021 yılında Md. Habibul Bashar ve arkadaşları $e^{-\phi(\xi)}$ yöntemini kullanarak (2+1)-dimensional Heisenberg ferromagnetic spin chain denkleminin analitik çözümlerini buldular (Bashar ve ark., 2021).

2021 yılında, kesirli mertebeden değiştirilmiş Kawahara denkleminin analitik çözümleri Md. Habibul Bashar ve arkadaşları tarafından yapılan çalışmada $e^{-\phi(\xi)}$ yöntemi uygulanarak elde edilmiştir. (Bahsar ve ark., 2021)

2021 yılında Nur Hasan Mahmud Shahen ve arkadaşları kesirli mertebeden Phi-four denkleminin analitik çözümlerini $e^{-\phi(\xi)}$ yöntemi uygulayarak elde ettiler (Shahen ve ark., 2021).

Ghazala Akram ve Naila Sajid, $e^{-\phi(\xi)}$ yöntemini uygulayarak, 2021 yılında Korteweg-de Vries (KdV) denkleminin analitik çözümlerini buldular (Akram ve Sajid, 2021).

2021 yılında Juan Yang ve Qingjiang Feng $e^{-\phi(\xi)}$ yöntemini uygulayarak (2+1) boyutlu sönümlü uzun dalga denkleminin analitik çözümlerini elde ettiler (Yang ve Feng,2021).

2021 yılında Shahzad Sarwar ve arkadaşları $e^{-\phi(\xi)}$ yöntemini uygulayarak kesirli mertebeden Fokas dinamik modelinin analitik çözümlerini buldular (Sarwar ve ark.,2021).

3. MATERYAL ve YÖNTEM

Bu kısımda, conformable kesirli türev yaklaşımının tanımı ve bazı özellikleri verildikten sonra $\boldsymbol{e^{-\phi(\xi)}}$ yöntemi verildi.

3.1. Conformable Kesirli Türevi

m pozitif tamsayısı için $p \in [m-1, m)$ olmak üzere bir g fonksiyonunun p −inci mertebeden Riemann-Liouville türev yaklaşımı

$$D_a^p[g(t)] = \frac{1}{\Gamma(m-p)} \frac{d^m}{dt^m} \int_a^t \frac{g(x)}{(t-x)^{p-m+1}}\, dx \qquad (3.1.1)$$

olarak tanımlanır (Khalil ve ark., 2014).

$p \in [m-1, m)$ için bir g fonksiyonunun p −inci mertebeden Caputo türev yaklaşımı

$$D_a^p[g(t)] = \frac{1}{\Gamma(m-p)} \int_a^t \frac{g^m(x)}{(t-x)^{p-m+1}}\, dx \qquad (3.1.2)$$

şeklindedir (Khalil ve ark., 2014).

Yukarıda verilen kesirli türev yaklaşımlarının her ikisi de lineer olma özelliğini sağlamaktadır (Khalil ve ark., 2014). Fakat bu kesirli türev yaklaşımlarının bazı dezavantajları aşağıda verildi (Khalil ve ark., 2014).

i. Sabit fonksiyonun Riemann-Liouville kesirli türevi sıfır değildir.

ii. Her iki kesirli türev yaklaşımı da iki fonksiyonun çarpımının türev formülünü sağlamaz.

iii. Her iki kesirli türev yaklaşımı da iki fonksiyonun bölümünün türev formülünü sağlamazlar.

iv. Her iki kesirli türev yaklaşımı

$$D_a^p((fog)(t)) = f^p\big(g(t)\big)g^p(t)$$

şeklindeki zincir kuralını sağlamazlar.

v. Her iki kesirli türev yaklaşımı $D^pD^kf(t) = D^{p+k}f(t)$ eşitliğini sağlamazlar.

2014 yılında, R. Khalil ve arkadaşları tarafından yukarıdaki özellikleri sağlayan ve conformable kesirli türev yaklaşımı olarak adlandırılan türev yaklaşımı verildi (Khalil ve ark., 2014).

Tanım 3.1: $f:[0,\infty)\to\mathbb{R}$, $t>0$ ve $p\in(0,1)$ olmak üzere p-inci mertebeden bir f fonksiyonunun conformable kesirli mertebeden türev yaklaşımı

$$T_p(f)(t)=\lim_{\varepsilon\to 0}\frac{f(t+\varepsilon t^{1-p})-f(t)}{\varepsilon}$$

şeklindedir. Eğer $a>0$ olmak üzere $(0,a)$ açık aralığında $f(t)$ fonksiyonu p-inci mertebeden diferansiyellenebilir ve $\lim_{t\to 0^+} f^{(p)}(t)$ limiti mevcut ise

$$f^{(p)}(0)=\lim_{t\to 0^+} f^{(p)}(t)$$

eşitliği geçerlidir (Khalil ve ark., 2014).

Teorem 3.1: Eğer $f:[0,\infty)\to\mathbb{R}$, $t_0>0$ ve $p\in(0,1]$ için bir f fonksiyonu p-inci mertebeden diferansiyellenebilir ise f fonksiyonu t_0 noktasında süreklidir denir (Khalil ve ark., 2014).

Teorem 3.2: $p\in(0,1]$ ve f,g fonksiyonları $t>0$ noktasında p-inci mertebeden diferansiyellenebilir olsun. Bu durumda

1) Her $a,b\in\mathbb{R}$ için $T_p(af(t)+bg(t))=aT_p(f(t))+bT_p(g(t))$,

2) Her $q\in\mathbb{R}$ için $T_p(t^q)=qt^{q-p}$,

3) Her $f(t)=d$ sabit fonksiyonu için $T_p(d)=0$,

4) $T_p(f(t)g(t))=f(t)T_p\big(g(t)\big)+g(t)T_p(f(t))$,

5) $T_p\left(\frac{f(t)}{g(t)}\right)=\frac{g(t)T_p(f(t))-f(t)T_p(g(t))}{[g(t)]^2}$,

6) $T_p(f(t))=t^{1-p}\frac{df(t)}{dt}$

eşitlikleri sağlanmaktadır (Khalil ve ark., 2014).

3.2. $e^{-\phi(\xi)}$ Yöntemi

$e^{-\phi(\xi)}$ yöntemi, lineer olmayan kısmi diferansiyel denklemlerin analitik çözümlerinin bulunmasında kullanılan bir yöntemdir. Bu yöntem, son zamanlarda, birçok araştırmacı tarafından conformable kesirli mertebeden diferansiyel denklemlerin analitik çözümlerinin elde etmek için kullanıldı (Hosseini ve ark., 2017; Rezazadeh ve ark., 2018; Ferdous ve ark., 2019; Kumar ve Ray, 2019; Bashar ve ark., 2021).

$\boldsymbol{e^{-\phi(\xi)}}$ yöntemi ile conformable kesirli mertebeden kısmi diferansiyel denklemlerin analitik olarak çözülebilmesi için aşağıdaki adımlar izlenir (Alam ve ark., 2015).

I. Adım: t zaman değişkenine göre conformable kesirli mertebeden türev içeren lineer olmayan kısmi diferansiyel denklemin genel formu

$$Q\left(\frac{\partial^p u}{\partial t^p}, \frac{\partial u}{\partial x}, \frac{\partial^2 u}{\partial x^2}, \frac{\partial^3 u}{\partial x^3}, \dots\right) = 0 \tag{3.1}$$

şeklindedir. Burada Q lineer olmayan bir fonksiyon ve $p \in (0,1)$ olmak üzere $\frac{\partial^p u}{\partial t^p}$ türevi de $u(x,t)$ fonksiyonunun t zaman değişkenine göre $p-$inci mertebeden conformable kesirli türevini temsil eder.

II. Adım: (3.1) ile verilen denklemde

$u(x,t) = U(\xi)$

ve w dalga hızı olmak üzere

$\xi = x + w\frac{t^p}{p}$

şeklinde dalga dönüşümünü kullanılırsa, (3.1) denklemi

$$G(U, U_\xi, U_{\xi\xi}, U_{\xi\xi\xi}, \dots) = 0 \tag{3.2}$$

şeklinde adi diferansiyel denkleme dönüşür.

III. Adım: (3.2) adi türevli diferansiyel denkleminin

$$U(\xi) = a_0 + \sum_{i=1}^{n} a_i \left(e^{-\phi(\xi)}\right)^n \tag{3.3}$$

biçiminde analitik çözümü aranır. Burada $i = 0,1,\dots,n$ olmak üzere a_i katsayıları belirlenecek olan katsayılar olup, $\phi(\xi)$ fonksiyonu ise

$$\phi'(\xi) = e^{-\phi(\xi)} + \mu e^{\phi(\xi)} + \lambda \tag{3.4}$$

adi türevli diferansiyel denkleminin çözümleridir. (3.4) ile verilen diferansiyel denklemin analitik çözümleri

$\mu \neq 0$, $\lambda^2 - 4\mu > 0$ olmak üzere

$$\phi_1(\xi)=\ln\left(\frac{-\sqrt{\lambda^2-4\mu}\tanh\left(\frac{\sqrt{\lambda^2-4\mu}}{2}(\xi+C)\right)-\lambda}{2\mu}\right) \tag{3.5}$$

$\mu\neq 0$, $\lambda^2-4\mu<0$ olmak üzere

$$\phi_2(\xi)=\ln\left(\frac{\sqrt{4\mu-\lambda^2}\tan\left(\frac{\sqrt{4\mu-\lambda^2}}{2}(\xi+C)\right)-\lambda}{2\mu}\right), \tag{3.6}$$

$\mu=0$, $\lambda\neq 0$ ve $\lambda^2-4\mu>0$ olmak üzere

$$\phi_3(\xi)=-\ln\left(\frac{\lambda}{e^{\lambda(\xi+C)-1}}\right), \tag{3.7}$$

$\mu\neq 0$, $\lambda\neq 0, \lambda^2-4\mu=0$ olmak üzere

$$\phi_4(\xi)=\ln\left(-\frac{2(\lambda(\xi+C)+2)}{\lambda^2(\xi+C)}\right), \tag{3.8}$$

$\mu=0$, $\lambda=0$, $\lambda^2-4\mu=0$ olmak üzere

$$\phi_5(\xi)=\ln(\xi+C) \tag{3.9}$$

şeklindedir.

(3.3) ile verilen denklemde bulunan n pozitif tamsayısı homojen denge olarak adlandırılan eşitlik yardımı ile bulunur. Bu eşitliği elde etmek için (3.3) denklemindeki lineer olan en yüksek mertebeden türev içeren terim $s=0,1,2,...$ için

$$O\left(\frac{d^sU}{d\xi^s}\right)=n+s,$$

olarak ve en yüksek dereceden lineer olmayan terim $s=0,1,2,...$ ve $q=0,1,2,...$ için

$$O\left(U^q\frac{d^sU}{d\xi^s}\right)=(q+1)n+s$$

şeklinde yazılarak, elde edilen ifadeler birbirine eşitlenir (Lai ve ark., 2009). Eşitlenen bu ifadelerden n pozitif değeri bulunur. Böylece, homojen denge yardımı ile elde edilen n pozitif tamsayısının (3.3) eşitliğinde kullanılması ile birlikte (3.2) adi türevli diferansiyel denklemin katsayıları daha sonra belirlenecek olan $U(\xi)$ analitik çözümü belirlenmiş olur.

IV. Adım: (3.3) eşitliği ve bu eşitliğin gerekli türevleri (3.4) denklemi yardımıyla elde edildikten sonra (3.2) denkleminde yerlerine yazılmasıyla $e^{-\phi(\xi)}$ kuvvetlerini içeren bir ifade elde edilir. Elde edilen ifadede bulunan $e^{-\phi(\xi)}$ terimlerinin kuvvetlerinin katsayıları sıfıra eşitlenmesi ile bir denklem sistemi oluşturulur. Bu denklem sisteminde bulunan λ, μ, w, a_i değerleri Wolfram Mathematica yardımıyla çözülerek bulunur. Elde edilen değerler ve (3.5)-(3.9) ile verilen formüllerin kullanılmasıyla (3.1) kesirli mertebeden kısmi diferansiyel denklemin analitik çözümleri elde edilir.

4. ARAŞTIRMA BULGULARI ve TARTIŞMA

Bu bölümde, zaman değişkenine göre conformable anlamında kesirli mertebeden türev içeren Boussinesq-Double Sinh-Gordon, yeni ikili Mkdv ve genelleştirilmiş Rosenau-Kawahara-RLW denklemlerinin analitik çözümleri $e^{-\phi(\xi)}$ yöntemi ile elde edildi.

4.1. Conformable Boussinesq-Double Sinh-Gordon Denkleminin Analitik Çözümleri

Bu kısımda conformable kesirli mertebeden Boussinesq-Double Sinh-Gordon denkleminin analitik çözümleri $e^{-\phi(\xi)}$ yöntemi ile elde edildi.

Conformable kesirli mertebeden Boussinesq-Double Sinh-Gordon denklemi

$$\frac{\partial^{2p}u}{\partial t^{2p}} - \alpha\frac{\partial^2 u}{\partial x^2} + \frac{\partial^4 u}{\partial x^4} = \sinh(u) + \frac{3}{2}\sinh(2u) \tag{4.1}$$

şeklindedir. Burada, $p \in (0,1)$ olmak üzere, $\frac{\partial^{2p}u}{\partial t^{2p}}$ ifadesi $u(x,t)$ fonksiyonunun t zaman değişkenine göre $2p$ −inci meretebeden conformable türevini göstermektedir. (4.1) ile verilen conformable kesirli mertebeden kısmi türevli denkleme

$$\xi = x + w\frac{t^p}{p} \tag{4.2}$$

şeklinde dalga dönüşümü uygulanırsa,

$$(w^2-\alpha)u'' + u^{(iv)} = \sinh(u) + \frac{3}{2}\sinh(2u)\ ) \tag{4.3}$$

adi türevli diferansiyel denklemi elde edilir. (4.3) adi türevli diferansiyel denklemine

$$v = e^u \tag{4.4}$$

dönüşümü uygulanır ve

$$\sinh(u) = \frac{v-v^{-1}}{2} \tag{4.5}$$

eşitliği kullanılırsa

$$-3v^2 - 2v^3 + 2v^5 + 3v^6 + (4w^2-4\alpha)v^2v'^2 + 24v'^4 - 4w^2v^3v'' + 4\alpha v^3v'' -$$
$$48k^4vv'^2v'' + 12v^2v''^2 + 16v^2v'v''' - 4v^3v^{(iv)} = 0 \tag{4.6}$$

eşitliği bulunur. $u(x,t)$ ile $v(x,t)$ arasındaki bağıntı ise (4.4) eşitliğinden

$$u = \ln v \tag{4.7}$$

olarak bulunur. (4.6) ile verilen denklemdeki en yüksek mertebeden türev içeren $v^3 v^{(iv)}$ terimi ile en yüksek mertebeden lineer olmayan v^6 terimi arasından

$3n + n + 4 = 6n$

eşitliği elde edilir ki, buradan

$n = 2$

olarak bulunur. Böylece (4.6) ile verilen adi türevli diferansiyel denklemin

$$v(\xi) = a_0 + a_1 e^{-\phi(\xi)} + a_2\left(e^{-\phi(\xi)}\right)^2 \qquad (4.8)$$

şeklinde analitik çözümü aranır. (4.8) ve (3.4) eşitliklerinden faydalanarak, (4.6) denkleminde bulunan $v(\xi)$ ifadesinin türevleri

$$v'(\xi) = -2a_2 e^{-3\phi(\xi)} + e^{-2\phi(\xi)}(-a_1 - 2a_2\lambda) - a_1\mu + e^{-\phi(\xi)}(-a_1\lambda - 2a_2\mu)$$

$$\begin{aligned} v''(\xi) = {} & 6a_2 e^{-4\phi(\xi)} + e^{-3\phi(\xi)}(2a_1 + 10a_2\lambda) + a_1\lambda\mu + 2a_2\mu^2 + e^{-2\phi(\xi)}(3a_1\lambda \\ & + 4a_2\lambda^2 + 8a_2\mu) + e^{-\phi(\xi)}(a_1\lambda^2 + 2a_1\mu + 6a_2\lambda\mu) \end{aligned}$$

$$\begin{aligned} v'''(\xi) = {} & -24a_2 e^{-5\phi(\xi)} + e^{-4\phi(\xi)}(-6a_1 - 54a_2\lambda) - a_1\lambda^2\mu - 2a_1\mu^2 - 6a_2\lambda\mu^2 \\ & + e^{-3\phi(\xi)}(-12a_1\lambda - 38a_2\lambda^2 - 40a_2\mu) + e^{-2\phi(\xi)}(-7a_1\lambda^2 - 8a_2\lambda^3 \\ & - 8a_1\mu - 52a_2\lambda\mu) + e^{-\phi(\xi)}(-a_1\lambda^3 - 8a_1\lambda\mu - 14a_2\lambda^2\mu - 16a_2\mu^2) \end{aligned}$$

$$\begin{aligned} v^{(iv)}(\xi) = {} & 120a_2 e^{-6\phi(\xi)} + e^{-5\phi(\xi)}(24a_1 + 336a_2\lambda) + a_1\lambda^3\mu + 8a_1\lambda\mu^2 + 14a_2\lambda^2\mu^2 \\ & + 16a_2\mu^3 + e^{-4\phi(\xi)}(60a_1\lambda + 330a_2\lambda^2 + 240a_2\mu) + e^{-3\phi(\xi)}(50a_1\lambda^2 \\ & + 130a_2\lambda^3 + 40a_1\mu + 440a_2\lambda\mu) + e^{-2\phi(\xi)}(15a_1\lambda^3 + 16a_2\lambda^4 \\ & + 60a_1\lambda\mu + 232a_2\lambda^2\mu + 136a_2\mu^2) + e^{-\phi(\xi)}(a_1\lambda^4 + 22a_1\lambda^2\mu \\ & + 30a_2\lambda^3\mu + 16a_1\mu^2 + 120a_2\lambda\mu^2) \end{aligned}$$

şeklinde bulunur. Elde edilen bu türevler ve (4.8) eşitliğinin (4.6) ile verilen denklemde yerlerine yazılıp, gerekli düzenlemelerin yapılmasıyla $e^{-\phi(\xi)}$ teriminin kuvvetlerinin katsayıları

$$\begin{aligned} e^{-0\phi(\xi)}: {} & -3{a_0}^2 - 2{a_0}^3 + 2{a_0}^5 + 3{a_0}^6 - 4{a_0}^3 a_1 w^2\lambda\mu + 4{a_0}^3 a_1\alpha\lambda\mu - 4a_0 a_1\lambda^3\mu \\ & + 4{a_0}^2{a_1}^2 w^2\mu^2 - 8a_0 a_2 w^2\mu^2 - 4{a_0}^2{a_1}^2\alpha\mu^2 + 8{a_0}^3 a_2\alpha\mu^2 \\ & - 32{a_0}^3 a_1\lambda\mu^2 + 28{a_0}^2{a_1}^2\lambda^2\mu^2 - 56{a_0}^3 a_2\lambda^2\mu^2 + 32{a_0}^2{a_1}^2\mu^3 \\ & - 64{a_0}^3 a_2\mu^3 - 48a_0{a_1}^3\lambda\mu^3 + 144{a_0}^2 a_1 a_2\lambda\mu^3 + 24a_1\mu^4 \\ & - 96a_0{a_1}^2 a_2\mu^4 + 48{a_0}^2{a_2}^2\mu^4 \end{aligned}$$

$$
\begin{aligned}
e^{-1\phi(\xi)}: &- 6a_0a_1 - 6{a_0}^2a_1 + 10{a_0}^4a_1 + 18{a_0}^5a_1 - 4{a_0}^3a_1w^2\lambda^2 + 4{a_0}^3a_1\alpha\lambda^2 \\
&- 4{a_0}^3a_1\lambda^4 - 8{a_0}^3a_1w^2\mu + 8{a_0}^3a_1\alpha\mu - 4{a_0}^2{a_1}^2w^2\lambda\mu \\
&- 24{a_0}^3a_2w^2\lambda\mu + 4{a_0}^2{a_1}^2\alpha\lambda\mu + 24{a_0}^3a_2\alpha\lambda\mu - 88{a_0}^3a_1\lambda^2\mu \\
&+ 44{a_0}^2{a_1}^2\lambda^3\mu - 120{a_0}^3a_2\lambda^3\mu - 64{a_0}^3a_1\mu^2 + 8a_0{a_1}^3w^2\mu^2 \\
&- 8{a_0}^2a_1a_2w^2\mu^2 - 8a_0{a_1}^3\alpha\mu^2 + 8{a_0}^2a_1a_2\alpha\mu^2 + 112{a_0}^2{a_1}^2\lambda\mu^2 \\
&- 480{a_0}^3a_2\lambda\mu^2 - 88a_0{a_1}^3\lambda^2\mu^2 + 376{a_0}^2a_1a_2\lambda^2\mu^2 - 32a_0{a_1}^3\mu^3 \\
&+ 224{a_0}^2a_1a_2\mu^3 + 48{a_1}^4\lambda\mu^3 - 384a_0{a_1}^2a_2\lambda\mu^3 + 480{a_0}^2{a_2}^2\lambda\mu^3 \\
&+ 96{a_1}^3a_2\mu^4 - 288a_0a_1{a_2}^2\mu^4 \\
e^{-2\phi(\xi)}: &- 3{a_1}^2 - 6a_0{a_1}^2 + 20{a_0}^3{a_1}^2 + 45{a_0}^4{a_1}^2 - 6a_0a_2 - 6{a_0}^2a_2 + 10{a_0}^4a_2 \\
&+ 18{a_0}^5a_2 - 12{a_0}^3a_1w^2\lambda + 12{a_0}^3a_1\alpha\lambda - 8{a_0}^2{a_1}^2w^2\lambda^2 \\
&- 16{a_0}^3a_2w^2\lambda^2 + 8{a_0}^2{a_1}^2\alpha\lambda^2 + 16{a_0}^3a_2\alpha\lambda^2 - 60{a_0}^3a_1\lambda^3 \\
&+ 16{a_0}^2{a_1}^2\lambda^4 - 64{a_0}^3a_2\lambda^4 - 16{a_0}^2{a_1}^2w^2\mu - 32{a_0}^3a_2w^2\mu \\
&+ 16{a_0}^2{a_1}^2\alpha\mu + 32{a_0}^3a_2\alpha\mu - 240{a_0}^3a_1\lambda\mu + 4a_0{a_1}^3w^2\lambda\mu \\
&- 52{a_0}^2a_1a_2w^2\lambda\mu - 4a_0{a_1}^3\alpha\lambda\mu + 52{a_0}^2a_1a_2\alpha\lambda\mu + 112{a_0}^2{a_1}^2\lambda^2\mu \\
&- 928{a_0}^3a_2\lambda^2\mu - 44a_0{a_1}^3\lambda^3\mu + 284{a_0}^2a_1a_2\lambda^3\mu + 16{a_0}^2{a_1}^2\mu^2 \\
&- 544{a_0}^3a_2\mu^2 + 4{a_1}^4w^2\mu^2 + 16\mathrm{a0}{a_1}^2a_2w^2\mu^2 - 8\mathrm{a0}^2{a_2}^2w^2\mu^2 \\
&- 4{a_1}^4\alpha\mu^2 - 16a_0{a_1}^2a_2\alpha\mu^2 + 8{a_0}^2{a_2}^2\alpha\mu^2 - 112a_0{a_1}^3\lambda\mu^2 \\
&+ 592{a_0}^2a_1a_2\lambda\mu^2 + 28{a_1}^4\lambda^2\mu^2 - 464a_0{a_1}^2a_2\lambda^2\mu^2 \\
&+ 1096{a_0}^2{a_2}^2\lambda^2\mu^2 + 32{a_1}^4\mu^3 - 256a_0{a_1}^2a_2\mu^3 + 704{a_0}^2{a_2}^2\mu^3 \\
&+ 192{a_1}^3a_2\lambda\mu^3 - 864a_0a_1{a_2}^2\lambda\mu^3 + 144{a_1}^2{a_2}^2\mu^4 - 288a_0{a_2}^3\mu^4 \\
e^{-3\phi(\xi)}: &- 2{a_1}^3 + 20{a_0}^2{a_1}^3 + 60{a_0}^3{a_1}^3 - 6a_1a_2 - 12a_0a_1a_2 + 40{a_0}^3a_1a_2 \\
&+ 90{a_0}^4a_1a_2 - 8{a_0}^3a_1w^2 + 8{a_0}^3a_1\alpha - 28{a_0}^2{a_1}^2w^2\lambda - 40{a_0}^3a_2w^2\lambda \\
&+ 28{a_0}^2{a_1}^2\alpha\lambda + 40{a_0}^3a_2\alpha\lambda - 200{a_0}^3a_1\lambda^2 - 4a_0{a_1}^3w^2\lambda^2 \\
&- 44{a_0}^2a_1a_2w^2\lambda^2 + 4a_0{a_1}^3\alpha\lambda^2 + 44{a_0}^2a_1a_2\alpha\lambda^2 + 20{a_0}^2{a_1}^2\lambda^3 \\
&- 520{a_0}^3a_2\lambda^3 - 4a_0{a_1}^3\lambda^4 + 52{a_0}^2a_1a_2\lambda^4 - 160{a_0}^3a_1\mu \\
&- 8a_0{a_1}^3w^2\mu - 88{a_0}^2a_1a_2w^2\mu + 8a_0{a_1}^3\alpha\mu + 88{a_0}^2a_1a_2\alpha\mu \\
&- 80{a_0}^2{a_1}^2\lambda\mu - 1760{a_0}^3a_2\lambda\mu + 4{a_1}^4w^2\lambda\mu - 16a_0{a_1}^2a_2w^2\lambda\mu \\
&- 40{a_0}^2{a_2}^2w^2\lambda\mu - 4{a_1}^4\alpha\lambda\mu + 16a_0{a_1}^2a_2\alpha\lambda\mu + 40{a_0}^2{a_2}^2\alpha\lambda\mu \\
&- 88a_0{a_1}^3\lambda^2\mu + 184{a_0}^2a_1a_2\lambda^2\mu + 4{a_1}^4\lambda^3\mu - 208a_0{a_1}^2a_2\lambda^3\mu
\end{aligned}
$$

$$+920a_0{}^2a_2{}^2\lambda^3\mu - 64a_0a_1{}^3\mu^2 - 128a_0{}^2a_1a_2\mu^2 + 16a_1{}^3a_2w^2\mu^2 + 16a_0a_1a_2{}^2w^2\mu^2$$
$$- 16a_1{}^3a_2\alpha\mu^2 - 16a_0a_1a_2{}^2\alpha\mu^2 + 32a_1{}^4\lambda\mu^2 - 704a_0a_1{}^2a_2\lambda\mu^2$$
$$+ 2560a_0{}^2a_2{}^2\lambda\mu^2 + 112a_1{}^3a_2\lambda^2\mu^2 - 752a_0a_1a_2{}^2\lambda^2\mu^2$$
$$+ 128a_1{}^3a_2\mu^3 - 448a_0a_1a_2{}^2\mu^3 + 288a_1{}^2a_2{}^2\lambda\mu^3 - 960a_0a_2{}^3\lambda\mu^3$$
$$+ 96a_1a_2{}^3\mu^4$$

$$e^{-4\phi(\xi)}: 10a_0a_1{}^4 + 45a_0{}^2a_1{}^4 - 6a_1{}^2a_2 + 60a_0{}^2a_1{}^2a_2 + 180a_0{}^3a_1{}^2a_2 - 3a_2{}^2$$
$$- 6a_0a_2{}^2 + 20a_0{}^3a_2{}^2 + 45a_0{}^4a_2{}^2 - 20a_0{}^2a_1{}^2w^2 - 24a_0{}^3a_2w^2$$
$$+ 20a_0{}^2\mathrm{a}a_1{}^2\alpha + 24a_0{}^3a_2\alpha - 240a_0{}^3a_1\lambda - 20a_0a_1{}^3w^2\lambda$$
$$- 124a_0{}^2a_1a_2w^2\lambda + 20a_0a_1{}^3\alpha\lambda + 124a_0{}^2a_1a_2\alpha\lambda - 140a_0{}^2a_1{}^2\lambda^2$$
$$- 1320a_0{}^3a_2\lambda^2 - 32a_0a_1{}^2a_2w^2\lambda^2 - 32a_0{}^2a_2{}^2w^2\lambda^2 + 32a_0a_1{}^2a_2\alpha\lambda^2$$
$$+ 32a_0{}^2a_2{}^2\alpha\lambda^2 - 20a_0a_1{}^3\lambda^3 - 220a_0{}^2a_1a_2\lambda^3 - 32a_0a_1{}^2a_2\lambda^4$$
$$+ 256a_0{}^2a_2{}^2\lambda^4 - 160a_0{}^2a_1{}^2\mu - 960a_0{}^3a_2\mu - 64a_0a_1{}^2a_2w^2\mu$$
$$- 64a_0{}^2a_2{}^2w^2\mu + 64a_0a_1{}^2a_2\alpha\mu + 64a_0{}^2a_2{}^2\alpha\mu - 160a_0a_1{}^3\lambda\mu$$
$$- 1280a_0{}^2a_1a_2\lambda\mu + 12a_1{}^3a_2w^2\lambda\mu - 28a_0a_1a_2{}^2w^2\lambda\mu - 12a_1{}^3a_2\alpha\lambda\mu$$
$$+ 28a_0a_1a_2{}^2\alpha\lambda\mu - 704a_0a_1{}^2a_2\lambda^2\mu + 2752a_0{}^2a_2{}^2\lambda^2\mu + 12a_1{}^3a_2\lambda^3\mu$$
$$- 124a_0a_1a_2{}^2\lambda^3\mu - 512a_0a_1{}^2a_2\mu^2 + 1216a_0{}^2a_2{}^2\mu^2$$
$$+ 28a_1{}^2a_2{}^2w^2\mu^2 + 8a_0a_2{}^3w^2\mu^2 - 28a_1{}^2a_2{}^2\alpha\mu^2 - 8a_0a_2{}^3\alpha\mu^2$$
$$+ 96a_1{}^3a_2\lambda\mu^2 - 512a_0a_1a_2{}^2\lambda\mu^2 + 196a_1{}^2a_2{}^2\lambda^2\mu^2$$
$$- 1096a_0a_2{}^3\lambda^2\mu^2 + 224a_1{}^2a_2{}^2\mu^3 - 704a_0a_2{}^3\mu^3 + 144a_1a_2{}^3\lambda\mu^3$$
$$+ 48a_2{}^4\mu^4$$

$$e^{-5\phi(\xi)}: 2a_1{}^5 + 18a_0a_1{}^5 + 40a_0a_1{}^3a_2 + 180a_0{}^2a_1{}^3a_2 - 6a_1a_2{}^2 + 60a_0{}^2a_1a_2{}^2$$
$$+ 180a_0{}^3a_1a_2{}^2 - 96a_0{}^3a_1 - 16a_0a_1{}^3w^2 - 80a_0{}^2a_1a_2w^2$$
$$+ 16a_0a_1{}^3\alpha + 80a_0{}^2a_1a_2\alpha - 288a_0{}^2a_1{}^2\lambda - 1344a_0{}^3a_2\lambda - 4a_1{}^4w^2\lambda$$
$$- 112a_0a_1{}^2a_2w^2\lambda - 88a_0{}^2a_2{}^2w^2\lambda + 4a_1{}^4\alpha\lambda + 112a_0a_1{}^2a_2\alpha\lambda$$
$$+ 88a_0{}^2a_2{}^2\alpha\lambda - 112a_0a_1{}^3\lambda^2 - 1424a_0{}^2a_1a_2\lambda^2 - 4a_1{}^3a_2w^2\lambda^2$$
$$- 44a_0a_1a_2{}^2w^2\lambda^2 + 4a_1{}^3a_2\alpha\lambda^2 + 44a_0a_1a_2{}^2\alpha\lambda^2 - 4a_1{}^4\lambda^3$$
$$- 304a_0a_1{}^2a_2\lambda^3 + 872a_0{}^2a_2{}^2\lambda^3 - 4a_1{}^3a_2\lambda^4 + 52a_0a_1a_2{}^2\lambda^4$$
$$- 128a_0a_1{}^3\mu - 1216a_0{}^2a_1a_2\mu - 8a_1{}^3a_2w^2\mu - 88a_0a_1a_2{}^2w^2\mu$$
$$+ 8a_1{}^3a_2\alpha\mu + 88a_0a_1a_2{}^2\alpha\mu - 32a_1{}^4\lambda\mu - 1472a_0a_1{}^2a_2\lambda\mu$$
$$+ 2176a_0{}^2a_2{}^2\lambda\mu + 20a_1{}^2a_2{}^2w^2\lambda\mu - 8a_0a_2{}^3w^2\lambda\mu - 20a_1{}^2a_2{}^2\alpha\lambda\mu$$
$$+ 8a_0a_2{}^3\alpha\lambda\mu - 88a_1{}^3a_2\lambda^2\mu$$

$$+184a_0a_1a_2{}^2\lambda^2\mu + 68a_1{}^2a_2{}^2\lambda^3\mu - 488a_0a_2{}^3\lambda^3\mu - 64a_1{}^3a_2\mu^2 - 128a_0a_1a_2{}^2\mu^2$$
$$+ 24a_1a_2{}^3w^2\mu^2 - 24a_1a_2{}^3\alpha\mu^2 + 304a_1{}^2a_2{}^2\lambda\mu^2 - 1504a_0a_2{}^3\lambda\mu^2$$
$$+ 24a_1a_2{}^3\lambda^2\mu^2 + 96a_1a_2{}^3\mu^3 + 96a_2{}^4\lambda\mu^3$$
$$e^{-6\phi(\xi)}: 3a_1{}^6 + 10a_1{}^4a_2 + 90a_0a_1{}^4a_2 + 60a_0a_1{}^2a_2{}^2 + 270a_0{}^2a_1{}^2a_2{}^2 - 2a_2{}^3$$
$$+ 20a_0{}^2a_2{}^3 + 60a_0{}^3a_2{}^3 - 144a_0{}^2a_1{}^2 - 480a_0{}^3a_2 - 4a_1{}^4w^2$$
$$- 80a_0a_1{}^2a_2w^2 - 56a_0{}^2a_2{}^2w^2 + 4a_1{}^4\alpha + 80a_0a_1{}^2a_2\alpha + 56a_0{}^2a_2{}^2\alpha$$
$$- 192a_0a_1{}^3\lambda - 2016a_0{}^2a_1a_2\lambda - 28a_1{}^3a_2w^2\lambda - 148a_0a_1a_2{}^2w^2\lambda$$
$$+ 28a_1{}^3a_2\alpha\lambda + 148a_0a_1a_2{}^2\alpha\lambda - 28a_1{}^4\lambda^2 - 1136a_0a_1{}^2a_2\lambda^2$$
$$+ 760a_0{}^2a_2{}^2\lambda^2 - 8a_1{}^2a_2{}^2w^2\lambda^2 - 16a_0a_2{}^3w^2\lambda^2 + 8a_1{}^2a_2{}^2\alpha\lambda^2$$
$$+ 16a_0a_2{}^3\alpha\lambda^2 - 76a_1{}^3a_2\lambda^3 + 188a_0a_1a_2{}^2\lambda^3 + 16a_1{}^2a_2{}^2\lambda^4$$
$$- 64a_0a_2{}^3\lambda^4 - 32a_1{}^4\mu - 1024a_0a_1{}^2a_2\mu + 320a_0{}^2a_2{}^2\mu$$
$$- 16a_1{}^2a_2{}^2w^2\mu - 32a_0a_2{}^3w^2\mu + 16a_1{}^2a_2{}^2\alpha\mu + 32a_0a_2{}^3\alpha\mu$$
$$- 368a_1{}^3a_2\lambda\mu - 176a_0a_1a_2{}^2\lambda\mu + 20a_1a_2{}^3w^2\lambda\mu - 20a_1a_2{}^3\alpha\lambda\mu$$
$$+ 112a_1{}^2a_2{}^2\lambda^2\mu - 928a_0a_2{}^3\lambda^2\mu - 28a_1a_2{}^3\lambda^3\mu + 16a_1{}^2a_2{}^2\mu^2$$
$$- 544a_0a_2{}^3\mu^2 + 8a_2{}^4w^2\mu^2 - 8a_2{}^4\alpha\mu^2 + 16a_1a_2{}^3\lambda\mu^2 + 56a_2{}^4\lambda^2\mu^2$$
$$+ 64a_2{}^4\mu^3$$
$$e^{-7\phi(\xi)}: 18a_1{}^5a_2 + 20a_1{}^3a_2{}^2 + 180a_0a_1{}^3a_2{}^2 + 40a_0a_1a_2{}^3 + 180a_0{}^2a_1a_2{}^3$$
$$- 96a_0a_1{}^3 - 864a_0{}^2a_1a_2 - 24a_1{}^3a_2w^2 - 104a_0a_1a_2{}^2w^2$$
$$+ 24a_1{}^3a_2\alpha + 104a_0a_1a_2{}^2\alpha - 48a_1{}^4\lambda - 1536a_0a_1{}^2a_2\lambda$$
$$- 96a_0{}^2a_2{}^2\lambda - 52a_1{}^2a_2{}^2w^2\lambda - 56a_0a_2{}^3w^2\lambda + 52a_1{}^2a_2{}^2\alpha\lambda$$
$$+ 56a_0a_2{}^3\alpha\lambda - 312a_1{}^3a_2\lambda^2 - 296a_0a_1a_2{}^2\lambda^2 - 4a_1a_2{}^3w^2\lambda^2$$
$$+ 4a_1a_2{}^3\alpha\lambda^2 - 4a_1{}^2a_2{}^2\lambda^3 - 152a_0a_2{}^3\lambda^3 - 4a_1a_2{}^3\lambda^4 - 288a_1{}^3a_2\mu$$
$$- 544a_0a_1a_2{}^2\mu - 8a_1a_2{}^3w^2\mu + 8a_1a_2{}^3\alpha\mu - 272a_1{}^2a_2{}^2\lambda\mu$$
$$- 736a_0a_2{}^3\lambda\mu + 8a_2{}^4w^2\lambda\mu - 8a_2{}^4\alpha\lambda\mu - 88a_1a_2{}^3\lambda^2\mu + 8a_2{}^4\lambda^3\mu$$
$$- 64a_1a_2{}^3\mu^2 + 64a_2{}^4\lambda\mu^2$$
$$e^{-8\phi(\xi)}: 45a_1{}^4a_2{}^2 + 20a_1{}^2a_2{}^3 + 180a_0a_1{}^2a_2{}^3 + 10a_0a_2{}^4 + 45a_0{}^2a_2{}^4 - 24a_1{}^4$$
$$- 672a_0a_1{}^2a_2 - 240a_0{}^2a_2{}^2 - 44a_1{}^2a_2{}^2w^2 - 40a_0a_2{}^3w^2$$
$$+ 44a_1{}^2a_2{}^2\alpha + 40a_0a_2{}^3\alpha - 432a_1{}^3a_2\lambda - 1008a_0a_1a_2{}^2\lambda$$
$$- 36a_1a_2{}^3w^2\lambda + 36a_1a_2{}^3\alpha\lambda - 308a_1{}^2a_2{}^2\lambda^2 - 280a_0a_2{}^3\lambda^2$$
$$- 36a_1a_2{}^3\lambda^3 - 352a_1{}^2a_2{}^2\mu - 320a_0a_2{}^3\mu - 288a_1a_2{}^3\lambda\mu$$

$e^{-9\phi(\xi)}$: $60a_1{}^3a_2{}^3 + 10a_1a_2{}^4 + 90a_0a_1a_2{}^4 - 192a_1{}^3a_2 - 576a_0a_1a_2{}^2 - 32a_1a_2{}^3w^2 + 32a_1a_2{}^3\alpha - 576a_1{}^2a_2{}^2\lambda - 384a_0a_2{}^3\lambda - 8a_2{}^4w^2\lambda + 8a_2{}^4\alpha\lambda - 224a_1a_2{}^3\lambda^2 - 8a_2{}^4\lambda^3 - 256a_1a_2{}^3\mu - 64a_2{}^4\lambda\mu$

$e^{-10\phi(\xi)}$: $45a_1{}^2a_2{}^4 + 2a_2{}^5 + 18a_0a_2{}^5 - 288a_1{}^2a_2{}^2 - 192a_0a_2{}^3 - 8a_2{}^4w^2 + 8a_2{}^4\alpha - 384a_1a_2{}^3\lambda - 56a_2{}^4\lambda^2 - 64a_2{}^4\mu$

$e^{-11\phi(\xi)}$: $18a_1a_2{}^5 - 192a_1a_2{}^3 - 96a_2{}^4\lambda$

$e^{-12\phi(\xi)}$: $3a_2{}^6 - 48a_2{}^4$

olarak elde edilir. Bu katsayılardan oluşan denklem sisteminin çözümlenmesiyle, birinci çözüm ailesinden elde edilen parametreler

$$a_2 = 4, \alpha = w^2 - 3, a_1 = -4\sqrt{a_0}, \lambda = -\sqrt{a_0}, \mu = \frac{a_0-1}{4} \tag{4.9}$$

şeklinde, ikinci çözüm ailesinden elde edilen parametreler

$$a_2 = 4, \alpha = w^2 + 1, a_1 = -4\sqrt{a_0}, \lambda = -\sqrt{a_0}, \mu = \frac{a_0+1}{4} \tag{4.10}$$

olarak, üçüncü çözüm ailesinden elde edilen parametreler

$$a_2 = 4, \alpha = w^2 - 3, a_1 = 4\sqrt{a_0}, \lambda = \sqrt{a_0}, \mu = \frac{a_0-1}{4} \tag{4.11}$$

şeklinde olup, dördüncü çözüm ailesinden elde edilen parametreler ise

$$a_2 = 4, \alpha = w^2 + 1, a_1 = 4\sqrt{a_0}, \lambda = \sqrt{a_0}, \mu = \frac{a_0+1}{4} \tag{4.12}$$

olarak bulunur. (4.9) ile bulunan parametre değerlerinin, (4.2) dalga dönüşümünün ve (3.5)-(3.9) analitik çözümlerinin (4.8) ile verilen denklemde yerlerine yazılmasıyla, $v(x,t)$ analitik çözümleri

$$v_1(x,t) = a_0 + \frac{(a_0-1)^2}{\left(\sqrt{a_0} - \tanh\left(\frac{1}{2}\left(x + w\frac{t^p}{p}\right)\right)\right)^2} - \frac{2\sqrt{a_0}(a_0-1)}{\sqrt{a_0} - \tanh\left(\frac{1}{2}\left(x + w\frac{t^p}{p}\right)\right)},$$

$$v_2(x,t) = 1 + \frac{4}{\left(-1 + e^{-\left(x+w\frac{t^p}{p}\right)}\right)^2} + \frac{4}{-1 + e^{-\left(x+w\frac{t^p}{p}\right)}}, a_0 = 1$$

olarak bulunur. (4.7) ile verilen formülün kullanılmasıyla, (4.1) ile verilen conformable kesirli mertebeden Boussinesq-Double Sinh-Gordon denkleminin analitik çözümleri

$$u_1(x,t)=\ln\left(a_0+\frac{(a_0-1)^2}{\left(\sqrt{a_0}-\tanh\left(\frac{1}{2}\left(x+w\frac{t^p}{p}\right)\right)\right)^2}-\frac{2\sqrt{a_0}(a_0-1)}{\sqrt{a_0}-\tanh\left(\frac{1}{2}\left(x+w\frac{t^p}{p}\right)\right)}\right),$$

$$u_2(x,t)=\ln\left(1+\frac{4}{\left(-1+e^{-\left(x+w\frac{t^p}{p}\right)}\right)^2}+\frac{4}{-1+e^{-\left(x+w\frac{t^p}{p}\right)}}\right),a_0=1$$

şeklinde elde edilir. (4.10) ile bulunan parametre değerlerinin, (4.2) dalga dönüşümünün ve (3.5)-(3.9) analitik çözümlerinin (4.8) ile verilen denklemde yerlerine yazılmasıyla, $v(x,t)$ analitik çözümü

$$v_3(x,t)=1+\frac{4}{\left(1+\tan\left(\frac{1}{2}\left(x+w\frac{t^p}{p}\right)\right)\right)^2}-\frac{4}{1+\tan\left(\frac{1}{2}\left(x+w\frac{t^p}{p}\right)\right)}$$

olarak bulunur. (4.7) formülünün kullanılmasıyla, (4.1) ile verilen conformable kesirli mertebeden Boussinesq-Double Sinh-Gordon denkleminin analitik çözümü

$$u_3(x,t)=\ln\left(1+\frac{4}{\left(1+\tan\left(\frac{1}{2}\left(x+w\frac{t^p}{p}\right)\right)\right)^2}-\frac{4}{1+\tan\left(\frac{1}{2}\left(x+w\frac{t^p}{p}\right)\right)}\right)$$

olarak bulunur. (4.11) ile bulunan parametre değerlerinin, (4.2) dalga dönüşümünün ve (3.5)-(3.9) analitik çözümlerinin (4.8) ile verilen denklemde yerlerine yazılmasıyla, $v(x,t)$ analitik çözümleri

$$v_4(x,t)=a_0+\frac{(a_0-1)^2}{\left(-\sqrt{a_0}-\tanh\left(\frac{1}{2}\left(x+w\frac{t^p}{p}\right)\right)\right)^2}+\frac{2\sqrt{a_0}(a_0-1)}{-\sqrt{a_0}-\tanh\left(\frac{1}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$v_5(x,t)=1+\frac{4}{\left(-1+e^{\left(x+w\frac{t^p}{p}\right)}\right)^2}+\frac{4}{-1+e^{\left(x+w\frac{t^p}{p}\right)}},a_0=1$$

olarak bulunur. (4.7) formülünün kullanılmasıyla, (4.1) ile verilen conformable kesirli mertebeden Boussinesq-Double Sinh-Gordon denkleminin analitik çözümleri

$$u_4(x,t) = \ln\left(a_0 + \frac{(a_0-1)^2}{\left(-\sqrt{a_0} - \tanh\left(\frac{1}{2}\left(x + w\frac{t^p}{p}\right)\right)\right)^2} + \frac{2\sqrt{a_0}(a_0-1)}{-\sqrt{a_0} - \tanh\left(\frac{1}{2}\left(x + w\frac{t^p}{p}\right)\right)} \right)$$

$$u_5(x,t) = \ln\left(1 + \frac{4}{\left(-1 + e^{\left(x + w\frac{t^p}{p}\right)}\right)^2} + \frac{4}{-1 + e^{\left(x + w\frac{t^p}{p}\right)}} \right), a_0 = 1$$

şeklindedir. (4.12) ile bulunan parametre değerlerinin, (4.2) dalga dönüşümünün ve (3.5)-(3.9) analitik çözümlerinin (4.8) ile verilen denklemde yerlerine yazılmasıyla, $v(x,t)$ analitik çözümü

$$v_6(x,t) = a_0 + \frac{(a_0+1)^2}{\left(-\sqrt{a_0} + \tanh\left(\frac{1}{2}\left(x + w\frac{t^p}{p}\right)\right)\right)^2} + \frac{2\sqrt{a_0}(a_0+1)}{-\sqrt{a_0} + \tanh\left(\frac{1}{2}\left(x + w\frac{t^p}{p}\right)\right)}$$

olarak bulunur. (4.7) formülünün kullanılmasıyla, (4.1) ile verilen conformable kesirli mertebeden Boussinesq-Double Sinh-Gordon denkleminin analitik çözümleri

$$u_6(x,t) = \ln\left(a_0 + \frac{(a_0+1)^2}{\left(-\sqrt{a_0} + \tanh\left(\frac{1}{2}\left(x + w\frac{t^p}{p}\right)\right)\right)^2} + \frac{2\sqrt{a_0}(a_0+1)}{-\sqrt{a_0} + \tanh\left(\frac{1}{2}\left(x + w\frac{t^p}{p}\right)\right)} \right)$$

şeklindedir.

4.2. Conformable Yeni İkili Mkdv Denkleminin Analitik Çözümleri

Bu kısımda conformable kesirli mertebeden yeni ikili Mkdv denkleminin analitik çözümleri $e^{-\phi(\xi)}$ yöntemi ile elde edildi. Conformable kesirli mertebeden yeni ikili Mkdv denklemi

$$\begin{aligned}
\frac{\partial^p u}{\partial t^p} &= \frac{1}{2}\frac{\partial^3 u}{\partial x^3} - 3u^2\frac{\partial u}{\partial x} + 3\frac{\partial}{\partial x}\left(v\frac{\partial v}{\partial x}\right) + 3\frac{\partial}{\partial x}(uv^2),\\
\frac{\partial^p v}{\partial t^p} &= -\frac{\partial^3 v}{\partial x^3} - 3\frac{\partial}{\partial x}\left(v\frac{\partial u}{\partial x}\right) + 6uv\frac{\partial u}{\partial x} + 3(u^2 - v^2)\frac{\partial v}{\partial x}
\end{aligned} \tag{4.13}$$

şeklindedir. Burada, $p \in (0,1)$ olmak üzere, $\frac{\partial^p u}{\partial t^p}$ ifadesi $u(x,t)$ fonksiyonunun ve $\frac{\partial^p v}{\partial t^p}$ ifadesi de $v(x,t)$ fonksiyonunun t zaman değişkenine göre $p-$inci meretebeden conformable türevlerini göstermektedir.(4.13) ile verilen denklem sistemine (4.2) ile verilen dalga dönüşümü uygulanır ve denklemler bir defa integre edililirse,

$$\begin{aligned}
c_1 + wu &= \frac{1}{2}u'' - u^3 + 3vv' + 3uv^2,\\
c_2 + wv &= -v'' - 3vu' - v^3 + 3u^2 v
\end{aligned} \tag{4.14}$$

adi türevli diferansiyel denklem sistemi bulunur. Buradaki c_1 ve c_2 değerleri integral sabitleridir. (4.14) ile verilen denklem sistemindeki ilk denklemde bulunan en yüksek mertebeden türev içeren u'' terimi ile en yüksek mertebeden lineer olmayan u^3 terimi arasından

$$n + 2 = 3n$$

eşitliği elde edilir ve buradan

$$n = 1$$

değeri bulunur. (4.14) denklem sistemindeki ikinci denklemde bulunan en yüksek mertebeden türev olan v'' terimi ile en yüksek mertebeden lineer olmayan v^3 terimi arasından elde edilen

$$m + 2 = 3m$$

eşitlikten

$$m = 1$$

olarak bulunur. Böylece (4.14) ile verilen adi türevli diferansiyel denklem sisteminin

$$\begin{aligned}
u(\xi) &= a_0 + a_1 e^{-\phi(\xi)},\\
v(\xi) &= b_0 + b_1 e^{-\phi(\xi)}
\end{aligned} \tag{4.15}$$

şeklinde analitik çözümleri aranır. (4.15) ve (3.4) eşitliklerinden, (4.14) adi türevli denklem sisteminde bulunan $u(\xi)$ ve $v(\xi)$ ifadelerinin türevleri

$$u'(\xi) = -a_1 e^{-2\phi(\xi)} - a_1 e^{-\phi(\xi)}\lambda - a_1\mu$$

$$v'(\xi) = -b_1 e^{-2\phi(\xi)} - b_1 e^{-\phi(\xi)}\lambda - b_1\mu$$

$$u''(\xi) = 2a_1e^{-3\phi(\xi)} + 3a_1e^{-2\phi(\xi)}\lambda + a_1\lambda\mu + e^{-\phi(\xi)}(a_1\lambda^2 + 2a_1\mu)$$
$$v''(\xi) = 2b_1e^{-3\phi(\xi)} + 3b_1e^{-2\phi(\xi)}\lambda + b_1\lambda\mu + e^{-\phi(\xi)}(b_1\lambda^2 + 2b_1\mu)$$

şeklinde elde edilir. Bulunan bu türevler ve (4.15) eşitliklerinin (4.14) ile verilen adi türevli denklem sisteminde yerlerine yazılıp gerekli düzenlemelerin yapılmasıyla, (4.14) denklem sisteminde bulunan ilk denklemin $e^{-\phi(\xi)}$ kuvvetlerinin katsayıları

$$e^{-0\phi(\xi)}: a_0^3 - 3a_0{b_0}^2 + c_1 + a_0w + 3b_0b_1\mu - \frac{a_1\lambda\mu}{2},$$
$$e^{-\phi(\xi)}: 3{a_0}^2a_1 - 3a_1{b_0}^2 - 6a_0b_0b_1 + a_1w + 3b_0b_1\lambda - \frac{a_1\lambda^2}{2} - a_1\mu + 3{b_1}^2\mu,$$
$$e^{-2\phi(\xi)}: 3a_0{a_1}^2 + 3b_0b_1 - 6a_1b_0b_1 - 3a_0{b_1}^2 - \frac{3a_1\lambda}{2} + 3{b_1}^2\lambda,$$
$$e^{-3\phi(\xi)}: -a_1 + {a_1}^3 + 3{b_1}^2 - 3a_1{b_1}^2$$

şeklinde, (4.14) denklem sisteminde bulunan ikinci denklemin $e^{-\phi(\xi)}$ kuvvetlerinin katsayıları ise

$$e^{-0\phi(\xi)}: -3{a_0}^2b_0 + {b_0}^3 + b_0w + -3a_1b_0\mu + b_1\lambda\mu + c_2,$$
$$e^{-\phi(\xi)}: -6a_0a_1b_0 - 3{a_0}^2b_1 + 3{b_0}^2b_1 + b_1w - 3a_1b_0\lambda + b_1\lambda^2 + 2b_1\mu - 3a_1b_1\mu,$$
$$e^{-2\phi(\xi)}: -3a_1b_0 - 3{a_1}^2b_0 - 6a_0a_1b_1 + 3b_0{b_1}^2 + 3b_1\lambda - 3a_1b_1\lambda,$$
$$e^{-3\phi(\xi)}: 2b_1 - 3a_1b_1 - 3{a_1}^2b_1 + {b_1}^3$$

şeklinde elde edilir. Bu katsayıların oluşturduğu denklem sisteminin çözümlenmesiyle; birinci çözüm kümesinden elde edilen parametrelerin değerleri

$$a_1 = \frac{1}{2},$$
$$a_0 = \frac{1}{12}\left(3\lambda - \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right),$$
$$b_0 = \frac{1}{12}\left(-3\lambda - \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right),$$
$$b_1 = -\frac{1}{2},$$
$$c_1 = \frac{1}{36}\Big(4\sqrt{3}w\sqrt{-8w + \lambda^2 - 4\mu} + \sqrt{3}\lambda^2\sqrt{-8w + \lambda^2 - 4\mu} - 4\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\mu\Big),$$
$$c_2 = \frac{1}{36}(4\sqrt{3}w\sqrt{-8w + \lambda^2 - 4\mu} + \sqrt{3}\lambda^2\sqrt{-8w + \lambda^2 - 4\mu} - 4\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\mu)$$

olarak, ikinci çözüm kümesinden elde edilen parametrelerin değerleri

$$a_1 = \frac{1}{2},$$
$$a_0 = \frac{1}{12}\left(3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right),$$

$$b_0 = \frac{1}{12}\left(-3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right),$$
$$b_1 = -\frac{1}{2},$$
$$c_1 = \frac{1}{36}\left(-4\sqrt{3}w\sqrt{-8w + \lambda^2 - 4\mu} - \sqrt{3}\lambda^2\sqrt{-8w + \lambda^2 - 4\mu} + 4\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\mu\right),$$
$$c_2 = \frac{1}{36}\left(-4\sqrt{3}w\sqrt{-8w + \lambda^2 - 4\mu} - \sqrt{3}\lambda^2\sqrt{-8w + \lambda^2 - 4\mu} + 4\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\mu\right)$$

olarak, üçüncü çözüm kümesinden elde edilen parametrelerin değerleri

$$a_1 = \frac{1}{2},$$
$$a_0 = \frac{1}{12}\left(3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right),$$
$$b_0 = \frac{1}{12}\left(3\lambda - \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right),$$
$$b_1 = \frac{1}{2},$$
$$c_1 = \frac{1}{36}\left(-4\sqrt{3}w\sqrt{-8w + \lambda^2 - 4\mu} - \sqrt{3}\lambda^2\sqrt{-8w + \lambda^2 - 4\mu} + 4\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\mu\right),$$
$$c_2 = \frac{1}{36}(4\sqrt{3}w\sqrt{-8w + \lambda^2 - 4\mu} + \sqrt{3}\lambda^2\sqrt{-8w + \lambda^2 - 4\mu} - 4\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\mu)$$

olarak, dördüncü çözüm kümesinden elde edilen parametrelerin değerleri ise

$$a_1 = \frac{1}{2},$$
$$a_0 = \frac{1}{12}\left(3\lambda - \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right),$$
$$b_0 = \frac{1}{12}\left(3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right),$$
$$b_1 = \frac{1}{2},$$
$$c_1 = \frac{1}{36}\left(4\sqrt{3}w\sqrt{-8w + \lambda^2 - 4\mu} + \sqrt{3}\lambda^2\sqrt{-8w + \lambda^2 - 4\mu} - 4\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\mu\right),$$
$$c_2 = \frac{1}{36}(-4\sqrt{3}w\sqrt{-8w + \lambda^2 - 4\mu} - \sqrt{3}\lambda^2\sqrt{-8w + \lambda^2 - 4\mu} + 4\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\mu)$$

şeklinde elde edilir. Birinci çözüm kümesinden elde edilen parametrelerin değerlerinin, (4.2) dalga dönüşümünün ve (3.5)-(3.9) analitik çözümlerinin (4.15) ile verilen denklemlerde yerlerine yazılmasıyla, $u(x,t)$ ve $v(x,t)$ analitik çözümleri

$$u_1(x,t)=\frac{1}{12}\left(3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)-\frac{\mu}{\lambda+\sqrt{\lambda^2-4\mu}\tanh\left(\frac{\sqrt{\lambda^2-4\mu}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$v_1(x,t)=\frac{1}{12}\left(-3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)+\frac{\mu}{\lambda+\sqrt{\lambda^2-4\mu}\tanh\left(\frac{\sqrt{\lambda^2-4\mu}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$u_2(x,t)=\frac{1}{12}\left(3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)-\frac{\mu}{\lambda-\sqrt{4\mu-\lambda^2}\tan\left(\frac{\sqrt{4\mu-\lambda^2}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$v_2(x,t)=\frac{1}{12}\left(-3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)+\frac{\mu}{\lambda-\sqrt{4\mu-\lambda^2}\tan\left(\frac{\sqrt{4\mu-\lambda^2}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$u_3(x,t)=\frac{1}{12}\left(3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2}\right)+\frac{\lambda}{2\left(-1+e^{\lambda\left(x+w\frac{t^p}{p}\right)}\right)},\mu=0,$$

$$v_3(x,t)=\frac{1}{12}\left(-3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2}\right)-\frac{\lambda}{2\left(-1+e^{\lambda\left(x+w\frac{t^p}{p}\right)}\right)},\mu=0,$$

$$u_4(x,t)=\frac{1}{12}\left(3\lambda-2\sqrt{-6w}\right)-\frac{\lambda^2\left(x+w\frac{t^p}{p}\right)}{4\left(2+\lambda\left(x+w\frac{t^p}{p}\right)\right)},\mu=\frac{\lambda^2}{4},$$

$$v_4(x,t)=\frac{1}{12}\left(-3\lambda-2\sqrt{-6w}\right)+\frac{\lambda^2\left(x+w\frac{t^p}{p}\right)}{4\left(2+\lambda\left(x+w\frac{t^p}{p}\right)\right)},\mu=\frac{\lambda^2}{4},$$

$$u_5(x,t)=-\frac{\sqrt{-w}}{\sqrt{6}}+\frac{1}{2\left(x+w\frac{t^p}{p}\right)},\mu=0,\lambda=0,$$

$$v_5(x,t) = -\frac{\sqrt{-w}}{\sqrt{6}} - \frac{1}{2\left(x + w\frac{t^p}{p}\right)}, \mu = 0, \lambda = 0$$

şeklinde elde edilir.İkinci çözüm kümesinden elde edilen parametrelerin değerlerinin(4.2) dalga dönüşümünün ve (3.5)-(3.9) analitik çözümlerinin (4.15) ile verilen denklemlerde yerlerine yazılmasıyla, $u(x,t)$ ve $v(x,t)$ analitik çözümleri

$$u_6(x,t) = \frac{1}{12}\left(3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right) - \frac{\mu}{\lambda + \sqrt{\lambda^2 - 4\mu}\tanh\left(\frac{\sqrt{\lambda^2 - 4\mu}}{2}\left(x + w\frac{t^p}{p}\right)\right)},$$

$$v_6(x,t) = \frac{1}{12}\left(\sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu} - 3\lambda\right) + \frac{\mu}{\lambda + \sqrt{\lambda^2 - 4\mu}\tanh\left(\frac{\sqrt{\lambda^2 - 4\mu}}{2}\left(x + w\frac{t^p}{p}\right)\right)},$$

$$u_7(x,t) = \frac{1}{12}\left(3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right) + \frac{\mu}{-\lambda + \sqrt{4\mu - \lambda^2}\tan\left(\frac{\sqrt{4\mu - \lambda^2}}{2}\left(x + w\frac{t^p}{p}\right)\right)},$$

$$v_7(x,t) = \frac{1}{12}\left(-3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right) + \frac{\mu}{\lambda - \sqrt{4\mu - \lambda^2}\tan\left(\frac{\sqrt{4\mu-\lambda^2}}{2}\left(x + w\frac{t^p}{p}\right)\right)},$$

$$u_8(x,t) = \frac{1}{12}\left(3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2}\right) + \frac{\lambda}{2\left(-1 + e^{\lambda\left(x+w\frac{t^p}{p}\right)}\right)}, \mu = 0,$$

$$v_8(x,t) = \frac{1}{12}\left(-3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2}\right) - \frac{\lambda}{2\left(-1 + e^{\lambda\left(x+w\frac{t^p}{p}\right)}\right)}, \mu = 0,$$

$$u_9(x,t) = \frac{1}{12}\left(3\lambda + 2\sqrt{-6w}\right) - \frac{\lambda^2\left(x + w\frac{t^p}{p}\right)}{4\left(2 + \lambda\left(x + w\frac{t^p}{p}\right)\right)}, \mu = \frac{\lambda^2}{4},$$

$$v_9(x,t) = \frac{1}{12}\left(2\sqrt{-6w} - 3\lambda\right) + \frac{\lambda^2\left(x + w\frac{t^p}{p}\right)}{4\left(2 + \lambda\left(x + w\frac{t^p}{p}\right)\right)}, \mu = \frac{\lambda^2}{4},$$

$$u_{10}(x,t) = \frac{\sqrt{-w}}{\sqrt{6}} + \frac{1}{2\left(x + w\frac{t^p}{p}\right)}, \mu = 0, \lambda = 0,$$

$$v_{10}(x,t) = \frac{\sqrt{-w}}{\sqrt{6}} - \frac{1}{2\left(x + w\frac{t^p}{p}\right)}, \mu = 0, \lambda = 0$$

şeklinde elde edilir. Üçüncü çözüm kümesinden elde edilen parametrelerin değerlerinin, (4.2) dalga dönüşümünün ve (3.5)-(3.9) analitik çözümlerinin (4.15) ile verilen denklemlerde yerlerine yazılmasıyla, $u(x,t)$ ve $v(x,t)$ analitik çözümleri

$$u_{11}(x,t) = \frac{1}{12}\left(3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right) - \frac{\mu}{\lambda + \sqrt{\lambda^2 - 4\mu}\tanh\left(\frac{\sqrt{\lambda^2 - 4\mu}}{2}\left(x + w\frac{t^p}{p}\right)\right)},$$

$$v_{11}(x,t) = \frac{1}{12}\left(3\lambda - \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right) - \frac{\mu}{\lambda + \sqrt{\lambda^2 - 4\mu}\tanh\left(\frac{\sqrt{\lambda^2 - 4\mu}}{2}\left(x + w\frac{t^p}{p}\right)\right)},$$

$$u_{12}(x,t) = \frac{1}{12}\left(3\lambda + \sqrt{3}\sqrt{-8w + \lambda^2 - 4\mu}\right) - \frac{\mu}{\lambda - \sqrt{4\mu - \lambda^2}\tan\left(\frac{\sqrt{4\mu - \lambda^2}}{2}\left(x + w\frac{t^p}{p}\right)\right)},$$

$$v_{12}(x,t)=\frac{1}{12}\left(3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)$$
$$+\frac{\mu}{-\lambda+\sqrt{4\mu-\lambda^2}\tan\left(\frac{\sqrt{4\mu-\lambda^2}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$u_{13}(x,t)=\frac{1}{12}\left(3\lambda+\sqrt{3}\sqrt{-8w+\lambda^2}\right)+\frac{\lambda}{2\left(-1+e^{\lambda\left(x+w\frac{t^p}{p}\right)}\right)},\mu=0,$$

$$v_{13}(x,t)=\frac{1}{12}\left(3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2}\right)+\frac{\lambda}{2\left(-1+e^{\lambda\left(x+w\frac{t^p}{p}\right)}\right)},\mu=0,$$

$$u_{14}(x,t)=\frac{1}{12}\left(3\lambda+2\sqrt{-6w}\right)-\frac{\lambda^2\left(x+w\frac{t^p}{p}\right)}{4\left(2+\lambda\left(x+w\frac{t^p}{p}\right)\right)},\mu=\frac{\lambda^2}{4},$$

$$v_{14}(x,t)=\frac{1}{12}\left(3\lambda-2\sqrt{-6w}\right)-\frac{\lambda^2\left(x+w\frac{t^p}{p}\right)}{4\left(2+\lambda\left(x+w\frac{t^p}{p}\right)\right)},\mu=\frac{\lambda^2}{4},$$

$$u_{15}(x,t)=\frac{\sqrt{-w}}{\sqrt{6}}+\frac{1}{2\left(x+w\frac{t^p}{p}\right)},\mu=0,\lambda=0,$$
$$v_{15}(x,t)=-\frac{\sqrt{-w}}{\sqrt{6}}+\frac{1}{2\left(x+w\frac{t^p}{p}\right)},\mu=0,\lambda=0,$$

şeklinde elde edilir.Dördüncü çözüm kümesinden elde edilen parametrelerin değerlerinin, (4.2) dalga dönüşümünün ve (3.5)-(3.9) analitik çözümlerinin (4.15) ile verilen denklemlerde yerlerine yazılmasıyla, $u(x,t)$ ve $v(x,t)$ analitik çözümleri

$$u_{16}(x,t)=\frac{1}{12}\left(3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)$$
$$-\frac{\mu}{\lambda+\sqrt{\lambda^2-4\mu}\tanh\left(\frac{\sqrt{\lambda^2-4\mu}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$v_{16}(x,t)=\frac{1}{12}\left(3\lambda+\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)$$
$$-\frac{\mu}{\lambda+\sqrt{\lambda^2-4\mu}\tanh\left(\frac{\sqrt{\lambda^2-4\mu}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$u_{17}(x,t)=\frac{1}{12}\left(3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)$$
$$+\frac{\mu}{-\lambda+\sqrt{4\mu-\lambda^2}\tan\left(\frac{\sqrt{4\mu-\lambda^2}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$v_{17}(x,t)=\frac{1}{12}\left(3\lambda+\sqrt{3}\sqrt{-8w+\lambda^2-4\mu}\right)$$
$$+\frac{\mu}{-\lambda+\sqrt{4\mu-\lambda^2}\tan\left(\frac{\sqrt{4\mu-\lambda^2}}{2}\left(x+w\frac{t^p}{p}\right)\right)},$$

$$u_{18}(x,t)=\frac{1}{12}\left(3\lambda-\sqrt{3}\sqrt{-8w+\lambda^2}\right)+\frac{\lambda}{2\left(-1+e^{\lambda\left(x+w\frac{t^p}{p}\right)}\right)},\mu=0,$$

$$v_{18}(x,t)=\frac{1}{12}\left(3\lambda+\sqrt{3}\sqrt{-8w+\lambda^2}\right)+\frac{\lambda}{2\left(-1+e^{\lambda\left(x+w\frac{t^p}{p}\right)}\right)},\mu=0,$$

$$u_{19}(x,t)=\frac{1}{12}\left(3\lambda-2\sqrt{-6w}\right))-\frac{\lambda^2\left(x+w\frac{t^p}{p}\right)}{4\left(2+\lambda\left(x+w\frac{t^p}{p}\right)\right)},\mu=\frac{\lambda^2}{4},$$

$$v_{19}(x,t)=\frac{1}{12}\left(3\lambda+2\sqrt{-6w}\right)-\frac{\lambda^2\left(x+w\frac{t^p}{p}\right)}{4\left(2+\lambda\left(x+w\frac{t^p}{p}\right)\right)},\mu=\frac{\lambda^2}{4},$$

$$u_{20}(x,t)=-\frac{\sqrt{-w}}{\sqrt{6}}+\frac{1}{2\left(x+w\frac{t^p}{p}\right)},\mu=0,\lambda=0,$$

$$v_{20}(x,t)=\frac{\sqrt{-w}}{\sqrt{6}}+\frac{1}{2\left(x+w\frac{t^p}{p}\right)},\mu=0,\lambda=0,$$

şeklinde elde edilir.

4.3. Conformable Genelleştirilmiş Rosenau-Kawahara-RLW Denkleminin Analitik Çözümleri

Bu kısımda conformable kesirli mertebeden genelleştirilmiş Rosenau-Kawahara-RLW denkleminin analitik çözümleri $e^{-\phi(\xi)}$ yöntemi ile elde edildi. Conformable kesirli mertebeden genelleştirilmiş Rosenau-Kawahara-RLW denklemi, p pozitif tamsayı olmak üzere,

$$\frac{\partial^k u}{\partial t^k} + \alpha \frac{\partial u}{\partial x} + \beta u^p \frac{\partial u}{\partial x} - \gamma \frac{\partial^k}{\partial t^k}\left(\frac{\partial^2 u}{\partial x^2}\right) + \varepsilon \frac{\partial^3 u}{\partial x^3} + \lambda \frac{\partial^p}{\partial t^p}\left(\frac{\partial^4 u}{\partial x^4}\right) + \mu \frac{\partial^5 u}{\partial x^5} = 0 \tag{4.16}$$

şeklindedir. Burada, $k \in (0,1)$ olmak üzere, $\frac{\partial^k u}{\partial t^k}$ ifadesi $u(x,t)$ fonksiyonunun t zaman değişkenine göre k −inci meretebeden conformable türevini göstermektedir. (4.16) ile verilen denkleme

$$\xi = x + w\frac{t^k}{k}$$

ile verilen dalga dönüşümü uygulanırsa

$$(w+\alpha)u' + \beta u^p u' + (\varepsilon - \gamma w)u''' + \lambda w u^{(iv)} + \mu u^{(v)} = 0 \tag{4.17}$$

adi türevli diferansiyel denklemi elde edilir. (4.17) ile verilen denklemi bir defa integre edilirse

$$(w+\alpha)u + \beta\frac{u^{p+1}}{p+1} + (\varepsilon - \gamma w)u'' + \lambda w u''' + \mu u^{(iv)} = 0 \tag{4.18}$$

eşitliği bulunur. (4.18) eşitliğinde

$$u = v^{\frac{1}{p}} \tag{4.19}$$

dönüşümü uygulanır ve gerekli düzenlemeler yapılırsa

$$p^4 v^4((1+p)(w+\alpha) + \beta v) - (p^2-1)(2p-1)(3p-1)(w\lambda+\mu)(v')^4 + 6(p^3 - p)(2p-1)(w\lambda+\mu)v(v')^2 v'' + p^2(p^2-1)v^2\big((w\gamma-\varepsilon)(v')^2 - 3(w\lambda+\mu)(v'')^2 - 4(w\lambda+\mu)v'v'''\big) - p^3(1+p)v^3((w\gamma-\varepsilon)v'' - (w\lambda+\mu)v^{(iv)}) = 0 \tag{4.20}$$

denklemi elde edilir. (4.20) ile verilen denklemdeki en yüksek mertebeden türev içeren $v^3 v''$ terimi ile en yüksek mertebeden lineer olmayan v^5 terimi arasından

$$4n + 2 = 5n$$

eşitliği bulunur ve buradan

$$n = 2$$

elde edilir. Böylece (4.20) ile verilen adi türevli diferansiyel denklemin

$$v(\xi) = a_0 + a_1 e^{-\phi(\xi)} + a_2\left(e^{-\phi(\xi)}\right)^2 \tag{4.21}$$

şeklinde analitik çözümü aranır. (4.21) eşitliğinden faydalanarak, (4.20) denkleminde bulunan $v(\xi)$ ifadesinin türevleri

$$\phi'(\xi) = e^{-\phi(\xi)} + b_1 e^{\phi(\xi)} + b_0$$

olmak üzere

$$v'(\xi) = -2a_2 e^{-3\phi(\xi)} + e^{-2\phi(\xi)}(-a_1 - 2a_2 b_0) - a_1 b_1 + e^{-\phi(\xi)}(-a_1 b_0 - 2a_2 b_1)$$

$$\begin{aligned} v''(\xi) = {} & 6a_2 e^{-4\phi(\xi)} + e^{-3\phi(\xi)}(2a_1 + 10a_2 b_0) + a_1 b_0 b_1 + 2a_2 {b_1}^2 + e^{-2\phi(\xi)}(3a_1 b_0 \\ & + 4a_2 {b_0}^2 + 8a_2 b_1) + e^{-\phi(\xi)}(a_1 {b_0}^2 + 2a_1 b_1 + 6a_2 b_0 b_1) \end{aligned}$$

$$\begin{aligned} v'''(\xi) = {} & -24a_2 e^{-5\phi(\xi)} + e^{-4\phi(\xi)}(-6a_1 - 54a_2 b_0) - a_1 {b_0}^2 b_1 - 2a_1 {b_1}^2 - 6a_2 b_0 {b_1}^2 \\ & + e^{-3\phi(\xi)}(-12a_1 b_0 - 38a_2 {b_0}^2 - 40a_2 b_1) + e^{-2\phi(\xi)}(-7a_1 {b_0}^2 \\ & - 8a_2 {b_0}^3 - 8a_1 b_1 - 52a_2 b_0 b_1) + e^{-\phi(\xi)}(-a_1 {b_0}^3 - 8a_1 b_0 b_1 \\ & - 14a_2 {b_0}^2 b_1 - 16a_2 {b_1}^2) \end{aligned}$$

$$\begin{aligned} v^{(iv)}(\xi) = {} & 120a_2 e^{-6\phi(\xi)} + e^{-5\phi(\xi)}(24a_1 + 336a_2 b_0) + a_1 b_0^3 \mu b_1 + 8a_1 b_0 {b_1}^2 \\ & + 14a_2 {b_0}^2 {b_1}^2 + 16a_2 {b_1}^3 + e^{-4\phi(\xi)}(60a_1 b_0 + 330a_2 {b_0}^2 + 240a_2 b_1) \\ & + e^{-3\phi(\xi)}(50a_1 {b_0}^2 + 130a_2 {b_0}^3 + 40a_1 b_1 + 440a_2 b_0 b_1) \\ & + e^{-2\phi(\xi)}(15a_1 {b_0}^3 + 16a_2 {b_0}^4 + 60a_1 b_0 b_1 + 232a_2 {b_0}^2 b_1 \\ & + 136a_2 {b_1}^2) + e^{-\phi(\xi)}(a_1 {b_0}^4 + 22a_1 {b_0}^2 b_1 + 30a_2 {b_0}^3 b_1 + 16a_1 {b_1}^2 \\ & + 120a_2 b_0 {b_1}^2) \end{aligned}$$

şeklinde bulunur. Elde edilen bu türevler ve (4.21) eşitliğinin (4.20) ile verilen denklemde yerlerine yazılıp, gerekli düzenlemelerin yapılmasıyla $e^{-\phi(\xi)}$ teriminin kuvvetlerinin katsayıları

$$
\begin{aligned}
e^{-0\phi(\xi)}\colon\ & a_0{}^4p^4w + a_0{}^4p^5w + a_0{}^4p^4\alpha + a_0{}^4p^5\alpha + a_0{}^5p^4\beta - a_0^2a_1{}^2b_1{}^2p^2w\gamma \\
& - a_0{}^3a_1b_0b_1p^3w\gamma - 2a_0{}^3a_2b_1{}^2p^3w\gamma - a_0{}^3a_1b_0b_1p^4w\gamma \\
& + a_0{}^2a_1{}^2b_1{}^2p^4w\gamma - 2a_0{}^3a_2b_1{}^2p^4w\gamma + a_0{}^2a_1{}^2b_1{}^2p^2\varepsilon \\
& + a_0{}^3a_1b_0b_1p^3\varepsilon + 2a_0{}^3a_2b_1{}^2p^3\varepsilon + a_0{}^3a_1b_0b_1p^4\varepsilon - a_0{}^2a_1{}^2b_1{}^2p^4\varepsilon \\
& + 2a_0{}^3a_2b_1{}^2p^4\varepsilon + a_1{}^4b_1{}^4w\lambda + 6a_0a_1{}^3b_0b_1{}^3pw\lambda - 5a_1{}^4b_1{}^4pw\lambda \\
& + 12a_0a_1{}^2a_2b_1{}^4pw\lambda + 7a_0{}^2a_1{}^2b_0{}^2b_1{}^2p^2w\lambda + 8a_0{}^2a_1{}^2b_1{}^3p^2w\lambda \\
& - 12a_0a_1{}^3b_0b_1{}^3p^2w\lambda + 36a_0{}^2a_1a_2b_0b_1{}^3p^2w\lambda + 5a_1{}^4b_1{}^4p^2w\lambda \\
& - 24a_0a_1{}^2a_2b_1{}^4p^2w\lambda + 12a_0{}^2a_2{}^2b_1{}^4p^2w\lambda + a_0{}^3a_1b_0{}^3b_1p^3w\lambda \\
& + 8a_0{}^3a_1b_0b_1{}^2p^3w\lambda + 14a_0{}^3a_2b_0{}^2b_1{}^2p^3w\lambda + 16a_0{}^3a_2b_1{}^3p^3w\lambda \\
& - 6a_0a_1{}^3b_0b_1{}^3p^3w\lambda + 5a_1{}^4b_1{}^4p^3w\lambda - 12a_0a_1{}^2a_2b_1{}^4p^3w\lambda \\
& + a_0{}^3a_1b_0{}^3b_1p^4w\lambda + 8a_0{}^3a_1b_0b_1{}^2p^4w\lambda - 7a_0{}^2a_1{}^2b_0{}^2b_1{}^2p^4w\lambda \\
& + 14a_0{}^3a_2b_0{}^2b_1{}^2p^4w\lambda
\end{aligned}
$$

$$
\begin{aligned}
-8a_0{}^2a_1{}^2b_1{}^3p^4w\lambda + 16a_0{}^3a_2b_1{}^3p^4w\lambda + 12a_0a_1{}^3b_0b_1{}^3p^4w & \\
& - 36a_0{}^2a_1a_2b_0b_1{}^3p^4w\lambda - 6a_1{}^4b_1{}^4p^4w\lambda + 24a_0a_1{}^2a_2b_1{}^4p^4w\lambda \\
& - 12a_0{}^2a_2{}^2b_1{}^4p^4w\lambda + a_1{}^4b_1{}^4\mu + 6a_0a_1{}^3b_0b_1{}^3p\mu - 5a_1{}^4b_1{}^4p\mu \\
& + 12a_0a_1{}^2a_2b_1{}^4p\mu + 7a_0{}^2a_1{}^2b_0{}^2b_1{}^2p^2\mu + 8a_0{}^2a_1{}^2b_1{}^3p^2\mu \\
& - 12a_0a_1{}^3b_0b_1{}^3p^2\mu + 36a_0{}^2a_1a_2b_0b_1{}^3p^2\mu + 5a_1{}^4b_1{}^4p^2\mu \\
& - 24a_0a_1{}^2a_2b_1{}^4p^2\mu + 12a_0{}^2a_2{}^2b_1{}^4p^2\mu + a_0{}^3a_1b_0{}^3b_1p^3\mu \\
& + 8a_0{}^3a_1b_0b_1{}^2p^3\mu + 14a_0{}^3a_2b_0{}^2b_1{}^2p^3\mu + 16a_0{}^3a_2b_1{}^3p^3\mu \\
& - 6a_0a_1{}^3b_0b_1{}^3p^3\mu + 5a_1{}^4b_1{}^4p^3\mu - 12a_0a_1{}^2a_2b_1{}^4p^3\mu \\
& + a_0{}^3a_1b_0{}^3b_1p^4\mu + 8a_0{}^3a_1b_0b_1{}^2p^4\mu - 7a_0a_1{}^2b_0{}^2b_1{}^2p^4\mu \\
& + 14a_0{}^3a_2b_0{}^2b_1{}^2p^4\mu - 8a_0{}^2a_1{}^2b_1{}^3p^4\mu + 16a_0a_2b_1{}^3p^4\mu \\
& + 12a_0a_1{}^3b_0b_1{}^3p^4\mu - 36a_0{}^2a_1a_2b_0b_1{}^3p^4\mu - 6a_1{}^4b_1{}^4p^4\mu \\
& + 24a_0a_1{}^2a_2b_1{}^4p^4\mu - 12a_0{}^2a_2{}^2b_1{}^4p^4\mu
\end{aligned}
$$

$$
\begin{aligned}
e^{-\phi(\xi)}: &\ 4a_0{}^3a_1p^4w + 4a_0{}^3a_1p^5w + 4a_0{}^3a_1p^4\alpha + 4a_0{}^3a_1p^5\alpha + 5a_0{}^4a_1p^4\beta \\
&- 2a_0{}^2a_1{}^2b_0b_1p^2w\gamma - 2a_0a_1{}^3b_1{}^2p^2w\gamma - 4a_0{}^2a_1a_2b_1{}^2p^2w\gamma \\
&- a_0{}^3a_1b_0{}^2p^3w\gamma - 2a_0{}^3a_1b_1p^3w\gamma - 3a_0{}^2a_1{}^2b_0b_1p^3w\gamma \\
&- 6a_0{}^3a_2b_0b_1p^3w\gamma - 6a_0{}^2a_1a_2b_1{}^2p^3w\gamma - a_0{}^3a_1b_0{}^2p^4w\gamma \\
&- 2a_0{}^3a_1b_1p^4w\gamma - a_0{}^2a_1{}^2b_0b_1p^4w\gamma - 6a_0{}^3a_2b_0b_1p^4w\gamma \\
&+ 2a_0a_1{}^3b_1{}^2p^4w\gamma - 2a_0{}^2a_1a_2b_1{}^2p^4w\gamma + 2a_0{}^2a_1{}^2b_0b_1p^2\varepsilon \\
&+ 2a_0a_1{}^3b_1{}^2p^2\varepsilon + 6a_0{}^2a_1a_2b_1{}^2p^3\varepsilon + a_0{}^3a_1b_0{}^2p^4\varepsilon + 2a_0{}^3a_1b_1p^4\varepsilon \\
&+ a_0{}^2a_1{}^2b_0b_1p^4\varepsilon + 6a_0{}^3a_2b_0b_1p^4\varepsilon - 2a_0a_1{}^3b_1{}^2p^4\varepsilon \\
&+ 2a_0{}^2a_1a_2b_1{}^2p^4\varepsilon + 4a_1{}^4b_0b_1{}^3w\lambda + 8a_1{}^3a_2b_1{}^4w\lambda \\
&+ 18a_0a_1{}^3b_0{}^2b_1{}^2pw\lambda + 12a_0a_1{}^3b_1{}^3pw\lambda - 14a_1{}^4b_0b_1{}^3pw\lambda \\
&+ 84a_0a_1{}^2a_2b_0b_1{}^3pw\lambda - 28a_1{}^3a_2b_1{}^4pw\lambda + 48a_0a_1a_2{}^2b_1{}^4pw\lambda \\
&+ 14a_0{}^2a_1{}^2b_0{}^3b_1p^2w\lambda + 52a_0{}^2a_1{}^2b_0b_1{}^2p^2w\lambda - 22a_0a_1{}^3b_0{}^2b_1{}^2p^2w\lambda \\
&+ 136a_0{}^2a_1a_2b_0{}^2b_1{}^2p^2w\lambda - 8a_0a_1{}^3b_1{}^3p^2w\lambda + 104a_0{}^2a_1a_2b_1{}^3p^2w\lambda \\
&+ 8a_1{}^4b_0b_1{}^3p^2w\lambda - 96a_0a_1{}^2a_2b_0b_1{}^3p^2w\lambda + 120a_0{}^2a_2{}^2b_0b_1{}^3p^2w\lambda \\
&+ 16a_1{}^3a_2b_1{}^4p^2w\lambda - 72a_0a_1a_2{}^2b_1{}^4p^2w\lambda + a_0{}^3a_1b_0{}^4p^3w\lambda \\
&+ 22a_0{}^3a_1b_0{}^2b_1p^3w\lambda + 3a_0{}^2a_1{}^2b_0{}^3b_1p^3w\lambda + 30a_0{}^3a_2b_0{}^3b_1p^3w\lambda \\
&+ 16a_0{}^3a_1b_1{}^2p^3w\lambda
\end{aligned}
$$

$$+24a_0{}^2a_1{}^2b_0b_1{}^2p^3w\lambda + 120a_0{}^3a_2b_0b_1{}^2p^3w\lambda - 18a_0a_1{}^3b_0{}^2b_1{}^2p^3w\lambda$$
$$+ 42a_0{}^2a_1a_2b_0{}^2b_1{}^2p^3w\lambda - 12a_0a_1{}^3b_1{}^3p^3w\lambda + 48a_0{}^2a_1a_2b_1{}^3p^3w\lambda$$
$$+ 14a_1{}^4b_0b_1{}^3p^3w\lambda - 84a_0a_1{}^2a_2b_0b_1{}^3p^3w\lambda + 28a_1{}^3a_2b_1{}^4p^3w\lambda$$
$$- 48a_0a_1a_2{}^2b_1{}^4p^3w\lambda + a_0{}^3a_1b_0{}^4p^4w\lambda + 22a_0{}^3a_1b_0{}^2b_1p^4w\lambda$$
$$- 11a_0{}^2a_1{}^2b_0{}^3b_1p^4w\lambda + 30a_0{}^3a_2b_0{}^3b_1p^4w\lambda + 16a_0{}^3a_1b_1{}^2p^4w\lambda$$
$$- 28a_0{}^2a_1{}^2b_0b_1{}^2p^4w\lambda + 120a_0{}^3a_2b_0b_1{}^2p^4w\lambda$$
$$+ 22a_0a_1{}^3b_0{}^2b_1{}^2p^4w\lambda - 94a_0{}^2a_1a_2b_0{}^2b_1{}^2p^4w\lambda + 8a_0a_1{}^3b_1{}^3p^4w\lambda$$
$$- 56a_0{}^2a_1a_2b_1{}^3p^4w\lambda - 12a_1{}^4b_0b_1{}^3p^4w\lambda + 96a_0a_1{}^2a_2b_0b_1{}^3p^4w\lambda$$
$$- 120a_0{}^2a_2{}^2b_0b_1{}^3p^4w\lambda - 24a_1{}^3a_2b_1{}^4p^4w\lambda + 72a_0a_1a_2{}^2b_1{}^4p^4w\lambda$$
$$+ 4a_1{}^4b_0b_1{}^3\mu + 8a_1{}^3a_2b_1{}^4\mu + 18a_0a_1{}^3b_0{}^2b_1{}^2p\mu + 12a_0a_1{}^3b_1{}^3p\mu$$
$$- 14a_1{}^4b_0b_1{}^3p\mu + 84a_0a_1{}^2a_2b_0b_1{}^3p\mu - 28a_1{}^3a_2b_1{}^4p\mu$$
$$+ 48a_0a_1a_2{}^2b_1{}^4p\mu + 14a_0{}^2a_1{}^2b_0{}^3b_1p^2\mu + 52a_0{}^2a_1{}^2b_0b_1{}^2p^2\mu$$
$$- 22a_0a_1{}^3b_0{}^2b_1{}^2p^2\mu + 136a_0{}^2a_1a_2b_0{}^2b_1{}^2p^2\mu - 8a_0a_1{}^3b_1{}^3p^2\mu$$
$$+ 104a_0{}^2a_1a_2b_1{}^3p^2\mu + 8a_1{}^4b_0b_1{}^3p^2\mu - 96a_0a_1{}^2a_2b_0b_1{}^3p^2$$
$$+120a_0{}^2a_2{}^2b_0b_1{}^3p^2\mu + 16a_1{}^3a_2b_1{}^4p^2\mu - 72a_0a_1a_2{}^2b_1{}^4p^2\mu + a_0{}^3a_1b_0{}^4p^3\mu$$
$$+ 22a_0{}^3a_1b_0{}^2b_1p^3\mu + 3a_0{}^2a_1{}^2b_0{}^3b_1p^3\mu + 30a_0{}^3a_2b_0{}^3b_1p^3\mu$$
$$+ 16a_0{}^3a_1b_1{}^2p^3\mu + 24a_0{}^2a_1{}^2b_0b_1{}^2p^3\mu + 120a_0{}^3a_2b_0b_1{}^2p^3\mu$$
$$- 18a_0a_1{}^3b_0{}^2b_1{}^2p^3\mu + 42a_0{}^2a_1a_2b_0{}^2b_1{}^2p^3\mu - 12a_0a_1{}^3b_1{}^3p^3\mu$$
$$+ 48a_0{}^2a_1a_2b_1{}^3p^3\mu + 14a_1{}^4b_0b_1{}^3p^3\mu - 84a_0a_1{}^2a_2b_0b_1{}^3p^3\mu$$
$$+ 28a_1{}^3a_2b_1{}^4p^3\mu - 48a_0a_1a_2{}^2b_1{}^4p^3\mu + 16a_0{}^3a_1b_1{}^2p^4\mu$$
$$- 28a_0{}^2a_1{}^2b_0b_1{}^2p^4\mu + 120a_0{}^3a_2b_0b_1{}^2p^4\mu + 22a_0a_1{}^3b_0{}^2b_1{}^2p^4\mu$$
$$- 94a_0{}^2a_1a_2b_0{}^2b_1{}^2p^4\mu + 8a_0a_1{}^3b_1{}^3p^4\mu - 56a_0{}^2a_1a_2b_1{}^3p^4\mu$$
$$- 12a_1{}^4b_0b_1{}^3p^4\mu + 96a_0a_1{}^2a_2b_0b_1{}^3p^4\mu - 120a_0{}^2a_2{}^2b_0b_1{}^3p^4\mu$$
$$- 24a_1{}^3a_2b_1{}^4p^4\mu + 72a_0a_1a_2{}^2b_1{}^4p^4\mu$$

$$
\begin{aligned}
e^{-2\phi(\xi)}\colon\ & 6{a_0}^2{a_1}^2p^4w + 4{a_0}^3a_2p^4w + 6{a_0}^2{a_1}^2p^5w + 4{a_0}^3a_2p^5w + 6{a_0}^2{a_1}^2p^4\alpha \\
& + 4{a_0}^3a_2p^4\alpha + 6{a_0}^2{a_1}^2p^5\alpha + 4{a_0}^3a_2p^5\alpha + 10{a_0}^3{a_1}^2p^4\beta \\
& + 5{a_0}^4a_2p^4\beta - {a_0}^2{a_1}^2{b_0}^2p^2w\gamma - 2{a_0}^2{a_1}^2b_1p^2w\gamma \\
& - 4a_0{a_1}^3b_0b_1p^2w\gamma - 8{a_0}^2a_1a_2b_0b_1p^2w\gamma - {a_1}^4{b_1}^2p^2w\gamma \\
& - 10a_0{a_1}^2a_2{b_1}^2p^2w\gamma - 4{a_0}^2{a_2}^2{b_1}^2p^2w\gamma - 3{a_0}^3a_1b_0p^3w\gamma \\
& - 3{a_0}^2{a_1}^2{b_0}^2p^3w\gamma - 4{a_0}^3a_2b_0p^3w\gamma - 6{a_0}^2{a_1}^2b_1p^3w\gamma \\
& - 8{a_0}^3a_2b_1p^3w\gamma - 3a_0{a_1}^3b_0b_1p^3w\gamma - 21{a_0}^2a_1a_2b_0b_1p^3w\gamma \\
& - 6a_0{a_1}^2a_2{b_1}^2p^3w\gamma - 6{a_0}^2{a_2}^2{b_1}^2p^3w\gamma - 3{a_0}^3a_1b_0p^4w\gamma \\
& - 2{a_0}^2{a_1}^2{b_0}^2p^4w\gamma - 4{a_0}^3a_2{b_0}^2p^4w\gamma - 4{a_0}^2{a_1}^2b_1p^4w\gamma \\
& - 8{a_0}^3a_2b_1p^4w\gamma + a_0{a_1}^3b_0b_1p^4w\gamma - 13{a_0}^2a_1a_2b_0b_1p^4w\gamma \\
& + {a_1}^4{b_1}^2p^4w\gamma + 4a_0{a_1}^2a_2{b_1}^2p^4w\gamma - 2{a_0}^2{a_2}^2{b_1}^2p^4w\gamma \\
& + {a_0}^2{a_1}^2{b_0}^2p^2\varepsilon + 2{a_0}^2{a_1}^2b_1p^2\varepsilon + 4a_0{a_1}^3b_0b_1p^2\varepsilon \\
& + 8a_0a_1a_2b_0b_1p^2\varepsilon + {a_1}^4{b_1}^2p^2\varepsilon + 10a_0{a_1}^2a_2{b_1}^2p^2\varepsilon \\
& + 4{a_0}^2{a_2}^2{b_1}^2p^2\varepsilon + 3{a_0}^3a_1b_0p^3\varepsilon + 3{a_0}^2{a_1}^2{b_0}^2p^3\varepsilon + 4{a_0}^3a_2{b_0}^2p^3\varepsilon \\
& + 6{a_0}^2{a_1}^2b_1p^3\varepsilon + 8{a_0}^3a_2b_1p^3\varepsilon + 3a_0{a_1}^3b_0b_1p^3\varepsilon \\
& + 21{a_0}^2a_1a_2b_0b_1p^3\varepsilon + 6a_0a_1a_2{b_1}^2p^3\varepsilon + 6{a_0}^2{a_2}^2{b_1}^2p^3\varepsilon \\
& + 3{a_0}^3a_1b_0p^4\varepsilon + 2{a_0}^2{a_1}^2{b_0}^2p^4\varepsilon + 4{a_0}^3a_2{b_0}^2p^4\varepsilon + 4{a_0}^2{a_1}^2b_1p^4\varepsilon \\
& + 8{a_0}^3a_2b_1p^4\varepsilon - a_0{a_1}^3b_0b_1p^4\varepsilon + 13{a_0}^2a_1a_2b_0b_1p^4\varepsilon - {a_1}^4{b_1}^2p^4\varepsilon \\
& - 4a_0{a_1}^2a_2{b_1}^2p^4\varepsilon + 2{a_0}^2{a_2}^2{b_1}^2p^4\varepsilon + 6{a_1}^4{b_0}^2{b_1}^2w\lambda + 4{a_1}^4{b_1}^3w\lambda \\
& + 32{a_1}^3a_2b_0{b_1}^3w\lambda + 24{a_1}^2{a_2}^2b_1w\lambda + 18a_0{a_1}^3{b_0}^3b_1pw\lambda \\
& + 54a_0{a_1}^3b_0{b_1}^2pw\lambda - 12{a_1}^4{b_0}^2{b_1}^2pw\lambda + 180a_0{a_1}^2a_2{b_0}^2{b_1}^2pw\lambda \\
& - 8{a_1}^4{b_1}^3pw\lambda + 120a_0{a_1}^2a_2{b_1}^3pw\lambda - 70{a_1}^3a_2b_0{b_1}^3pw\lambda \\
& + 264a_0a_1{a_2}^2b_0{b_1}^3pw\lambda - 60{a_1}^2a_2{b_1}^4pw\lambda + 48a_0{a_2}^3{b_1}^4pw\lambda \\
& + 7{a_0}^2{a_1}^2{b_0}^4p^2w\lambda
\end{aligned}
$$

$$+94a_0{}^2a_1{}^2b_0{}^2b_1p^2w\lambda - 8a_0a_1b_0{}^3b_1p^2w\lambda + 164a_0{}^2a_1a_2b_0{}^3b_1p^2w\lambda$$
$$+ 52a_0{}^2a_1{}^2b_1{}^2p^2w\lambda - 4a_0a_1{}^3b_0b_1{}^2p^2w\lambda + 532a_0{}^2a_1a_2b_0b_1p^2w\lambda$$
$$+ a_1{}^4b_0{}^2b_1{}^2p^2w\lambda - 74a_0a_1{}^2a_2b_0{}^2b_1{}^2p^2w\lambda + 316a_0{}^2a_2{}^2b_0{}^2b_1{}^2p^2w\lambda$$
$$+ 4a_1{}^4b_1p^2w\lambda - 16a_0a_1{}^2a_2b_1{}^3p^2w\lambda + 224a_0{}^2a_2{}^2b_1{}^3p^2w\lambda$$
$$+ 16a_1{}^3a_2b_0b_1{}^3p^2w\lambda - 216a_0a_1a_2{}^2b_0b_1{}^3p^2w\lambda + 12a_1{}^2a_2{}^2b_1{}^4p^2w\lambda$$
$$- 72a_0a_2{}^3b_1{}^4p^2w\lambda + 15a_0{}^3a_1b_0{}^3p^3w\lambda + 3a_0{}^2a_1{}^2b_0{}^4p^3w\lambda$$
$$+ 16a_0{}^3a_2b_0{}^4p^3w\lambda + 60a_0{}^3a_1b_0b_1p^3w\lambda + 66a_0{}^2a_1{}^2b_0{}^2b_1p^3w\lambda$$
$$+ 232a_0{}^3a_2b_0{}^2b_1p^3w\lambda - 15a_0a_1{}^3b_0{}^3b_1p^3w\lambda + 93a_0{}^2a_1a_2b_0b_1p^3w\lambda$$
$$+ 48a_0{}^2a_1{}^2b_1{}^2p^3w\lambda + 136a_0{}^3a_2b_1{}^2p^3w\lambda - 30a_0a_1{}^3b_0b_1{}^2p^3w\lambda$$
$$+ 384a_0{}^2a_1a_2b_0b_1{}^2p^3w\lambda + 12a_1{}^4b_0{}^2b_1{}^2p^3w\lambda$$
$$- 138a_0a_1{}^2a_2b_0{}^2b_1{}^2p^3w\lambda + 42a_0{}^2a_2{}^2b_0{}^2b_1{}^2p^3w\lambda + 8a_1{}^4b_1{}^3p^3w\lambda$$
$$- 72a_0a_1{}^2a_2b_1{}^3p^3w\lambda + 48a_0{}^2a_2{}^2b_1{}^3p^3w\lambda + 70a_1{}^3a_2b_0b_1{}^3p^3w\lambda$$
$$- 264a_0a_1a_2{}^2b_0b_1{}^3p^3w\lambda + 60a_1{}^2a_2{}^2b_1{}^4p^3w\lambda - 48a_0a_2{}^3b_1{}^4p^3w\lambda$$
$$+ 15a_0{}^3a_1b_0{}^3p^4w\lambda - 4a_0{}^2a_1{}^2b_0{}^4p^4w\lambda + 16a_0{}^3a_2b_0{}^4p^4w\lambda$$
$$+ 60a_0{}^3a_1b_0b_1p^4w\lambda - 28a_0{}^2a_1{}^2b_0{}^2b_1p^4w\lambda + 232a_0{}^3a_2b_0{}^2b_1p^4w\lambda$$
$$+ 11a_0a_1{}^3b_0{}^3b_1p^4w\lambda - 71a_0{}^2a_1a_2b_0{}^3b_1p^4w\lambda - 4a_0{}^2a_1{}^2\mathrm{b1}^2p^4w\lambda$$
$$+ 136a_0{}^3a_2\mathrm{b1}^2p^4w\lambda + 28a_0a_1{}^3b_0b_1{}^2p^4w\lambda - 148a_0{}^2a_1a_2b_0b_1{}^2p^4w\lambda$$
$$- 7a_1{}^4b_0{}^2b_1{}^2p^4w\lambda + 116a_0a_1{}^2a_2b_0{}^2b_1{}^2p^4w\lambda$$
$$- 274a_0{}^2a_2{}^2b_0{}^2b_1{}^2p^4w\lambda - 8a_1{}^4b_1{}^3p^4w\lambda + 64a_0a_1{}^2a_2b_1{}^3p^4w\lambda$$
$$- 176a_0{}^2a_2{}^2b_1{}^3p^4w\lambda - 48a_1{}^3a_2b_0b_1{}^3p^4w\lambda$$
$$+ 216a_0a_1a_2{}^2b_0b_1{}^3p^4w\lambda - 36a_1{}^2a_2{}^2b_1{}^4p^4w\lambda + 72a_0a_2{}^3b_1{}^4p^4w\lambda$$
$$+ 6a_1{}^4b_0{}^2b_1{}^2\mu + 4a_1{}^4b_1{}^3\mu + 32a_1{}^3a_2b_0b_1{}^3\mu + 24a_1{}^2a_2{}^2b_1{}^4\mu$$
$$+ 18a_0a_1{}^3b_0{}^3b_1p\mu + 54a_0a_1{}^3b_0b_1{}^2p\mu - 12a_1{}^4b_0{}^2b_1{}^2p\mu$$
$$+ 180a_0a_1{}^2a_2b_0{}^2b_1{}^2p\mu - 8a_1{}^4b_1{}^3p\mu + 120a_0a_1{}^2a_2b_1{}^3p\mu$$
$$- 70a_1{}^3a_2b_0b_1{}^3p\mu + 264a_0a_1a_2{}^2b_0b_1{}^3p\mu - 60a_1{}^2a_2{}^2b_1{}^4p\mu$$
$$+ 48a_0a_2{}^3b_1{}^4p\mu + 7a_0{}^2a_1{}^2b_0{}^4p^2\mu + 94a_0{}^2a_1{}^2b_0{}^2b_1p^2\mu$$

$$-8a_0a_1{}^3b_0{}^3b_1p^2\mu + 164a_0{}^2a_1a_2b_0{}^3b_1p^2\mu + 52a_0{}^2a_1{}^2b_1{}^2p^2\mu - 4a_0a_1{}^3b_0b_1{}^2p^2\mu$$
$$+ 532a_0{}^2a_1a_2b_0b_1{}^2p^2\mu + a_1{}^4b_0{}^2b_1{}^2p^2\mu - 74a_0a_1{}^2a_2b_0{}^2b_1{}^2p^2\mu$$
$$+ 316a_0{}^2a_2{}^2b_0{}^2b_1{}^2p^2\mu + 4a_1{}^4b_1{}^3p^2\mu - 16a_0a_1{}^2a_2b_1{}^3p^2\mu$$
$$+ 224a_0{}^2a_2{}^2b_1{}^3p^2\mu + 16a_1{}^3a_2b_0b_1{}^3p^2\mu - 216a_0a_1a_2{}^2b_0b_1{}^3p^2\mu$$
$$+ 12a_1{}^2a_2{}^2b_1{}^4p^2\mu - 72a_0a_2{}^3b_1{}^4p^2\mu + 15a_0{}^3a_1b_0{}^3p^3\mu$$
$$+ 3a_0{}^2a_1{}^2b_0{}^4p^3\mu$$
$$+16a_0{}^3a_2b_0{}^4p^3\mu + 60a_0{}^3a_1b_0b_1p^3\mu + 66a_0{}^2a_1{}^2b_0{}^2b_1p^3\mu + 232a_0{}^3a_2b_0{}^2b_1p^3\mu$$
$$- 15a_0a_1{}^3b_0{}^3b_1p^3\mu + 93a_0{}^2a_1a_2b_0{}^3b_1p^3\mu + 48a_0{}^2a_1{}^2b_1{}^2p^3\mu$$
$$+ 136a_0{}^3a_2b_1{}^2p^3\mu - 30a_0a_1{}^3b_0b_1{}^2p^3\mu + 384a_0{}^2a_1a_2b_0b_1{}^2p^3\mu$$
$$+ 12a_1{}^4b_0{}^2b_1{}^2p^3\mu - 138a_0a_1{}^2a_2b_0{}^2b_1{}^2p^3\mu + 42a_0{}^2a_2{}^2b_0{}^2b_1{}^2p^3\mu$$
$$+ 8a_1{}^4b_1{}^3p^3\mu - 72a_0a_1{}^2a_2b_1{}^3p^3\mu + 48a_0{}^2a_2{}^2b_1{}^3p^3\mu$$
$$+ 70a_1{}^3a_2b_0b_1{}^3p^3\mu - 264a_0a_1a_2{}^2b_0b_1{}^3p^3\mu + 60a_1{}^2a_2{}^2b_1{}^4p^3\mu$$
$$- 48a_0a_2{}^3b_1{}^4p^3\mu + 15a_0{}^3a_1b_0{}^3p^4\mu - 4a_0{}^2a_1{}^2b_0{}^4p^4\mu$$
$$+ 16a_0{}^3a_2b_0{}^4p^4\mu + 60a_0{}^3a_1b_0b_1p^4\mu - 28a_0{}^2a_1{}^2b_0{}^2b_1p^4\mu$$
$$+ 232a_0{}^3a_2b_0{}^2b_1p^4\mu + 11a_0a_1{}^3b_0{}^3b_1p^4\mu - 71a_0{}^2a_1a_2b_0{}^3b_1p^4\mu$$
$$- 4a_0{}^2a_1{}^2b_1{}^2p^4\mu + 136a_0{}^3a_2b_1{}^2p^4\mu + 28a_0a_1{}^3b_1{}^2p^4\mu$$
$$- 148a_0{}^2a_1a_2b_0b_1{}^2p^4\mu - 7a_1{}^4b_0{}^2b_1{}^2p^4\mu + 116a_0a_1{}^2a_2b_0{}^2b_1{}^2p^4\mu$$
$$- 274a_0{}^2a_2{}^2b_0{}^2b_1{}^2p^4\mu - 8a_1{}^4b_1{}^3p^4\mu + 64a_0a_1{}^2a_2b_1{}^3p^4\mu$$
$$- 176a_0{}^2a_2{}^2b_1{}^3p^4\mu - 48\mathrm{a1}^3a_2b_0b_1{}^3p^4\mu + 216a_0a_1a_2{}^2b_0b_1{}^3p^4\mu$$
$$- 36a_1{}^2a_2{}^2b_1{}^4p^4\mu + 72a_0a_2{}^3b_1{}^4p^4\mu$$

$$
\begin{aligned}
e^{-3\phi(\xi)}:\ & 4a_0{a_1}^3p^4w + 12{a_0}^2a_1a_2p^4w + 4a_0{a_1}^3p^5w + 12{a_0}^2a_1a_2p^5w + 4a_0{a_1}^3p^4\alpha \\
& + 12{a_0}^2a_1a_2p^4\alpha + 4a_0{a_1}^3p^5\alpha + 12{a_0}^2a_1a_2p^5\alpha + 10{a_0}^2{a_1}^3p^4\beta \\
& + 20{a_0}^3a_1a_2p^4\beta - 2{a_0}^2{a_1}^2b_0p^2w\gamma - 2a_0{a_1}^3{b_0}^2p^2w\gamma \\
& - 4{a_0}^2a_1a_2{b_0}^2p^2w\gamma - 4a_0{a_1}^3b_1p^2w\gamma - 8{a_0}^2a_1a_2b_1p^2w\gamma \\
& - 2{a_1}^4b_0b_1p^2w\gamma - 20a_0{a_1}^2a_2b_0b_1p^2w\gamma - 8{a_0}^2{a_2}^2b_0b_1p^2w\gamma \\
& - 6{a_1}^3a_2{b_1}^2p^2w\gamma - 16a_0a_1{a_2}^2{b_1}^2p^2w\gamma - 2{a_0}^3a_1p^3w\gamma \\
& - 9{a_0}^2{a_1}^2b_0p^3w\gamma - 10{a_0}^3a_2b_0p^3w\gamma - 3a_0{a_1}^3{b_0}^2p^3w\gamma \\
& - 15{a_0}^2a_1a_2{b_0}^2p^3w\gamma - 6a_0{a_1}^3b_1p^3w\gamma - 30{a_0}^2a_1a_2b_1p^3w\gamma \\
& - {a_1}^4b_0b_1p^3w\gamma - 24a_0{a_1}^2a_2b_0b_1p^3w\gamma - 18{a_0}^2{a_2}^2b_0b_1p^3w\gamma \\
& - 2{a_1}^3a_2{b_1}^2p^3w\gamma - 12a_0a_1{a_2}^2{b_1}^2p^3w\gamma - 2a_0a_1p^4w\gamma \\
& - 7{a_0}^2{a_1}^2b_0p^4w\gamma - 10{a_0}^3a_2b_0p^4w\gamma - a_0{a_1}^3{b_0}^2p^4w\gamma \\
& - 11{a_0}^2a_1a_2{b_0}^2p^4w\gamma - 2a_0{a_1}^3b_1p^4w\gamma - 22{a_0}^2a_1a_2b_1p^4w\gamma \\
& + {a_1}^4b_0b_1p^4w\gamma - 4a_0{a_1}^2a_2b_0b_1p^4w\gamma - 10{a_0}^2{a_2}^2b_0b_1p^4w\gamma \\
& + 4{a_1}^3a_2{b_1}^2p^4w\gamma + 4a_0a_1{a_2}^2b_1p^4w\gamma + 2{a_0}^2{a_1}^2b_0p^2\varepsilon \\
& + 2a_0{a_1}^3b_0p^2\varepsilon + 4{a_0}^2a_1a_2{b_0}^2p^2\varepsilon + 4a_0{a_1}^3b_1p^2\varepsilon + 8{a_0}^2a_1a_2b_1p^2\varepsilon \\
& + 2{a_1}^4b_0b_1p^2\varepsilon + 20a_0{a_1}^2a_2b_0b_1p^2\varepsilon + 8{a_0}^2{a_2}^2b_0b_1p^2\varepsilon \\
& + 6{a_1}^3a_2{b_1}^2p^2\varepsilon + 16a_0a_1{a_2}^2{b_1}^2p^2\varepsilon + 2{a_0}^3a_1p^3\varepsilon + 9{a_0}^2{a_1}^2b_0p^3\varepsilon \\
& + 10{a_0}^3a_2b_0p^3\varepsilon + 3a_0{a_1}^3{b_0}^2p^3\varepsilon
\end{aligned}
$$

$$+15a_0{}^2a_1a_2b_0{}^2p^3\varepsilon + 6a_0a_1{}^3b_1p^3\varepsilon + 30a_0{}^2a_1a_2b_1p^3\varepsilon + a_1{}^4b_0b_1p^3\varepsilon$$
$$+ 24a_0a_1{}^2a_2b_0b_1p^3\varepsilon + 18a_0{}^2a_2{}^2b_0b_1p^3\varepsilon + 2a_1{}^3a_2b_1{}^2p^3\varepsilon$$
$$+ 12a_0a_1a_2{}^2b_1{}^2p^3\varepsilon + 2a_0{}^3a_1p^4\varepsilon + 7a_0{}^2a_1{}^2b_0p^4\varepsilon + 10a_0{}^3a_2b_0p^4\varepsilon$$
$$+ a_0a_1{}^3b_0{}^2p^4\varepsilon + 11a_0{}^2a_1a_2b_0{}^2p^4\varepsilon + 2a_0a_1{}^3b_1p^4\varepsilon$$
$$+ 22a_0{}^2a_1a_2b_1p^4\varepsilon - a_1{}^4b_0b_1p^4\varepsilon + 4a_0a_1{}^2a_2b_0b_1p^4\varepsilon$$
$$+ 10a_0{}^2a_2{}^2b_0b_1p^4\varepsilon - 4a_1{}^3a_2b_1{}^2p^4\varepsilon - 4a_0a_1a_2{}^2b_1{}^2p^4\varepsilon$$
$$+ 4a_1{}^4b_0{}^3b_1w\lambda + 12a_1{}^4b_1w\lambda + 48a_1{}^3a_2b_0{}^2b_1{}^2w\lambda + 32a_1{}^3a_2b_1{}^3w\lambda$$
$$+ 96a_1a_2{}^2b_0b_1{}^3w\lambda + 32a_1a_2{}^3b_1{}^4w\lambda + 6a_0a_1{}^3b_0{}^4pw\lambda$$
$$+ 72a_0a_1{}^3b_0{}^2b_1pw\lambda - 2a_1{}^4b_0{}^3b_1pw\lambda + 156a_0a_1{}^2a_2b_0b_1pw\lambda$$
$$+ 36a_0a_1{}^3b_1{}^2pw\lambda - 6a_1{}^4b_0b_1{}^2pw\lambda + 468a_0a_1{}^2a_2b_0b_1{}^2pw\lambda$$
$$- 42a_1{}^3a_2b_0{}^2b_1{}^2pw\lambda + 504a_0a_1a_2{}^2b_0{}^2b_1{}^2pw\lambda - 28a_1{}^3a_2b_1{}^3pw\lambda$$
$$+ 336a_0a_1a_2{}^2b_1{}^3pw\lambda - 132a_1a_2{}^2b_0b_1{}^3pw\lambda + 240a_0a_2{}^3b_0b_1{}^3pw\lambda$$
$$- 64a_1a_2{}^3b_1{}^4pw\lambda + 50a_0{}^2a_1{}^2b_0{}^3p^2w\lambda + 2a_0a_1{}^3b_0{}^4p^2w\lambda$$
$$+ 64a_0{}^2a_1a_2b_0{}^4p^2w\lambda + 160a_0{}^2a_1{}^2b_0b_1p^2w\lambda + 44a_0a_1{}^3b_0{}^2b_1p^2w\lambda$$
$$+ 808a_0{}^2a_1a_2b_0{}^2b_1p^2w\lambda - 2a_1{}^4b_0{}^3b_1p^2w\lambda + 44a_0a_1{}^2a_2b_0{}^3b_1p^2w\lambda$$
$$+ 320a_0a_2{}^2b_0{}^3b_1p^2w\lambda + 32a_0a_1{}^3b_1{}^2p^2w\lambda + 424a_0{}^2a_1a_2b_1{}^2p^2w\lambda$$
$$+ 4a_1{}^4b_0b_1{}^2p^2w\lambda + 232a_0a_1{}^2a_2b_0b_1{}^2p^2w\lambda$$
$$+ 1000a_0{}^2a_2{}^2b_0b_1{}^2p^2w\lambda - 6a_1{}^3a_2b_0{}^2b_1{}^2p^2w\lambda$$
$$- 104a_0a_1a_2{}^2b_0{}^2b_1{}^2p^2w\lambda + 16a_1{}^3a_2\, b_1{}^3p^2w\lambda - 16a_0a_1a_2{}^2b_1{}^3p^2w\lambda$$
$$- 24a_1{}^2a_2{}^2b_0b_1{}^3p^2w\lambda - 240a_0a_2{}^3b_0b_1{}^3p^2w\lambda - 8a_1a_2{}^3b_1{}^4p^2w\lambda$$
$$+ 50a_0{}^3a_1b_0{}^2p^3w\lambda + 45a_0{}^2a_1{}^2b_0{}^3p^3w\lambda + 130a_0{}^3a_2b_0{}^3p^3w\lambda$$
$$- 3a_0a_1{}^3b_0{}^4p^3w\lambda + 51a_0{}^2a_1a_2b_0{}^4p^3w\lambda + 40a_0{}^3a_1b_1p^3w\lambda$$
$$+ 180a_0{}^2a_1{}^2b_0b_1p^3w\lambda + 440a_0{}^3a_2b_0b_1p^3w\lambda - 6a_0a_1{}^3b_0{}^2b_1p^3w\lambda$$
$$+ 762a_0{}^2a_1a_2b_0{}^2b_1p^3w\lambda + 3a_1{}^4b_0{}^3b_1p^3w\lambda - 60a_0a_1{}^2a_2b_0{}^3b_1p^3w\lambda$$
$$+ 90a_0{}^2a_2{}^2b_0{}^3b_1p^3w\lambda + 12\mathrm{a0}a_1{}^3b_1{}^2p^3w\lambda + 456a_0{}^2a_1a_2b_1{}^2p^3w\lambda$$
$$+ 14a_1{}^4b_0b_1{}^2p^3w\lambda - 60a_0a_1{}^2a_2b_0b_1{}^2p^3w\lambda + 360a_0{}^2a_2{}^2b_0b_1{}^2p^3w\lambda$$
$$+ 56\mathrm{a1}^3a_2b_0{}^2b_1{}^2p^3w\lambda - 420a_0a_1a_2{}^2b_0{}^2b_1{}^2p^3w\lambda$$
$$+ 44a_1{}^3a_2b_1{}^3p^3w\lambda - 240a_0a_1a_2{}^2b_1{}^3p^3w\lambda + 132a_1{}^2a_2{}^2b_0b_1{}^3p^3w\lambda$$
$$- 240a_0a_2{}^3b_0b_1{}^3p^3w\lambda + 64a_1a_2{}^3b_1{}^4p^3w\lambda + 50a_0{}^3a_1b_0{}^2p^4w\lambda$$
$$- 5a_0{}^2a_1{}^2b_0{}^3p^4w\lambda + 130a_0{}^3a_2b_0{}^3p^4w\lambda + a_0a_1{}^3b_0{}^4p^4w\lambda$$

$$
\begin{aligned}
&- 13a_0{}^2a_1a_2b_0{}^4p^4w\lambda + 40a_0{}^3a_1b_1p^4w\lambda + 20a_0{}^2a_1{}^2b_0b_1p^4w\lambda \\
&+ 440a_0{}^3a_2b_0b_1p^4w\lambda + 22a_0a_1{}^3b_0{}^2b_1p^4w\lambda - 46a_0{}^2a_1a_2b_0{}^2b_1p^4w\lambda \\
&- a_1{}^4b_0{}^3b_1p^4w\lambda + 52a_0a_1{}^2a_2b_0{}^3b_1p^4w\lambda - 230a_0{}^2a_2{}^2b_0{}^3b_1p^4w\lambda \\
&+ 16a_0a_1{}^3b_1{}^2p^4w\lambda + 32a_0{}^2a_1a_2b_1{}^2p^4w\lambda - 8a_1{}^4b_0b_1{}^2p^4w\lambda \\
&+ 176a_0a_1{}^2a_2b_0b_1{}^2p^4w\lambda - 640a_0{}^2a_2{}^2b_0b_1{}^2p^4w\lambda \\
&- 28a_1{}^3a_2b_0{}^2b_1{}^2p^4w\lambda + 188a_0a_1a_2{}^2b_0{}^2b_1{}^2p^4w\lambda \\
&- 32a_1{}^3a_2b_1{}^3p^4w\lambda + 112a_0a_1a_2{}^2b_1{}^3p^4w\lambda - 72a_1{}^2a_2{}^2b_0b_1{}^3p^4w\lambda \\
&+ 240a_0a_2{}^3b_0b_1{}^3p^4w\lambda - 24a_1a_2{}^3b_1{}^4p^4w\lambda + 4a_1{}^4b_0{}^3b_1\mu \\
&+ 12a_1{}^4b_0b_1{}^2\mu + 48a_1{}^3a_2b_0{}^2b_1{}^2\mu + 32a_1{}^3a_2b_1{}^3\mu + 96a_1{}^2a_2{}^2b_0b_1{}^3\mu \\
&+ 32a_1a_2{}^3b_1{}^4\mu + 6a_0a_1{}^3b_0{}^4p\mu + 72a_0a_1{}^3b_0{}^2b_1p\mu - 2a_1{}^4b_0{}^3b_1p\mu \\
&+ 156a_0a_1{}^2a_2b_0{}^3b_1p\mu + 36a_0a_1{}^3b_1{}^2p\mu - 6a_1{}^4b_0b_1{}^2p\mu \\
&+ 468a_0a_1{}^2a_2b_0b_1{}^2p\mu - 42a_1{}^3a_2b_0{}^2b_1{}^2p\mu + 504a_0a_1a_2{}^2b_0{}^2b_1{}^2p\mu \\
&- 28a_1{}^3a_2b_1{}^3p\mu + 336a_0a_1a_2{}^2b_1{}^3p\mu - 132a_1{}^2a_2{}^2b_0b_1{}^3p\mu \\
&+ 240a_0a_2{}^3b_0b_1{}^3p\mu - 64a_1a_2{}^3b_1{}^4p\mu + 50a_0{}^2a_1{}^2b_0{}^3p^2\mu \\
&+ 2a_0a_1{}^3b_0{}^4p^2\mu + 64a_0{}^2a_1a_2b_0{}^4p^2\mu + 160a_0{}^2a_1{}^2b_0b_1p^2\mu \\
&+ 44a_0a_1{}^3b_0{}^2b_1p^2\mu + 808a_0{}^2a_1a_2b_0{}^2b_1p^2\mu - 2a_1{}^4b_0{}^3b_1p^2\mu \\
&+ 44a_0a_1{}^2a_2b_0{}^3b_1p^2\mu + 320a_0{}^2a_2{}^2b_0{}^3b_1p^2\mu + 32a_0a_1{}^3b_1{}^2p^2\mu \\
&+ 424a_0{}^2a_1a_2b_1{}^2p^2\mu + 4a_1{}^4b_0b_1{}^2p^2\mu + 232a_0a_1{}^2a_2b_0b_1{}^2p^2\mu \\
&+ 1000a_0{}^2a_2{}^2b_0b_1{}^2p^2\mu - 6a_1{}^3a_2b_0{}^2b_1{}^2p^2\mu - 104a_0a_1a_2{}^2b_0{}^2b_1{}^2p^2\mu \\
&+ 16a_1{}^3a_2b_1{}^3p^2\mu - 16a_0a_1a_2{}^2b_1{}^3p^2\mu - 24a_1{}^2a_2{}^2b_0b_1{}^3p^2\mu \\
&- 240a_0a_2{}^3b_0b_1{}^3p^2\mu - 8a_1a_2{}^3b_1{}^4p^2\mu + 50a_0{}^3a_1b_0{}^2p^3\mu \\
&+ 45a_0{}^2a_1{}^2b_0{}^3p^3\mu + 130a_0{}^3a_2b_0{}^3p^3\mu - 3a_0a_1{}^3b_0{}^4p^3\mu \\
&+ 51a_0{}^2a_1a_2b_0{}^4p^3\mu + 40a_0{}^3a_1b_1p^3\mu + 180a_0{}^2a_1{}^2b_0b_1p^3\mu \\
&+ 440a_0{}^3a_2b_0b_1p^3\mu - 6a_0a_1{}^3b_0{}^2b_1p^3\mu + 762a_0{}^2a_1a_2b_0{}^2b_1p^3\mu \\
&+ 3a_1{}^4b_0{}^3b_1p^3\mu - 60a_0a_1{}^2a_2b_0{}^3b_1p^3\mu + 90a_0{}^2a_2{}^2b_0{}^3b_1p^3\mu
\end{aligned}
$$

$$
\begin{aligned}
&+12a_0a_1{}^3b_1{}^2p^3\mu + 456a_0{}^2a_1a_2b_1{}^2p^3\mu + 14a_1{}^4b_0b_1{}^2p^3\mu - 60a_0a_1{}^2a_2b_0b_1{}^2p^3\mu \\
&\qquad + 360a_0{}^2a_2{}^2b_0b_1{}^2p^3\mu + 56a_1{}^3a_2b_0{}^2b_1{}^2p^3\mu - 420a_0a_1a_2{}^2b_0{}^2b_1{}^2p^3\mu \\
&\qquad + 44a_1{}^3a_2b_1{}^3p^3\mu - 240a_0a_1a_2{}^2b_1{}^3p^3\mu + 132a_1{}^2a_2{}^2b_0b_1{}^3p^3\mu \\
&\qquad - 240a_0a_2{}^3b_0b_1{}^3p^3\mu + 64a_1a_2{}^3b_1{}^4p^3\mu + 50a_0{}^3a_1b_0{}^2p^4\mu \\
&\qquad - 5a_0{}^2a_1{}^2b_0{}^3p^4\mu + 130a_0{}^3a_2b_0{}^3p^4\mu + a_0a_1{}^3b_0{}^4p^4\mu \\
&\qquad - 13a_0{}^2a_1a_2b_0{}^4p^4\mu + 40a_0{}^3a_1b_1p^4\mu + 20a_0{}^2a_1{}^2b_0b_1p^4\mu \\
&\qquad + 440a_0{}^3a_2b_0b_1p^4\mu + 22a_0a_1{}^3b_0{}^2b_1p^4\mu - 46a_0{}^2a_1a_2b_0{}^2b_1p^4\mu \\
&\qquad - a_1{}^4b_0{}^3b_1p^4\mu + 52a_0a_1{}^2a_2b_0{}^3b_1p^4\mu - 230a_0{}^2a_2{}^2b_0{}^3b_1p^4\mu \\
&\qquad + 16a_0a_1{}^3b_1{}^2p^4\mu + 32a_0{}^2a_1a_2b_1{}^2p^4\mu - 8a_1{}^4b_0b_1{}^2p^4\mu \\
&\qquad + 176a_0a_1{}^2a_2b_0b_1{}^2p^4\mu - 640a_0{}^2a_2{}^2b_0b_1\mu + 112a_0\,a_1a_2{}^2b_1{}^3p^4\mu \\
&\qquad - 72a_1{}^2a_2{}^2b_0b_1{}^3p^4\mu + 240a_0a_2{}^3b_0b_1{}^3p^4\mu - 24a_1a_2{}^3b_1{}^4p^4\mu \\
&\qquad + 808a_0{}^2a_1a_2b_0{}^2b_1p^2\mu - 2a_1{}^4b_0{}^3b_1p^2\mu + 44a_0a_1{}^2a_2b_0{}^3b_1p^2\mu \\
&\qquad + 320a_0{}^2a_2{}^2b_0{}^3b_1p^2\mu + 32a_0a_1{}^3b_1{}^2p^2\mu + 424a_0{}^2a_1a_2b_1{}^2p^2\mu \\
&\qquad + 4a_1{}^4b_0b_1{}^2p^2\mu + 232a_0a_1{}^2a_2b_0b_1{}^2p^2\mu + 1000a_0{}^2a_2{}^2b_0b_1{}^2p^2\mu \\
&\qquad - 6a_1{}^3a_2b_0{}^2b_1{}^2p^2\mu - 104a_0a_1a_2{}^2b_0{}^2b_1{}^2p^2\mu + 16a_1{}^3a_2b_1{}^3p^2\mu \\
&\qquad - 16a_0a_1a_2{}^2b_1{}^3p^2\mu - 24a_1{}^2a_2{}^2b_0b_1{}^3p^2\mu - 240a_0a_2{}^3b_0b_1{}^3p^2\mu \\
&\qquad - 8a_1a_2{}^3b_1{}^4p^2\mu + 50a_0{}^3a_1b_0{}^2p^3\mu + 45a_0{}^2a_1{}^2b_0{}^3p^3\mu \\
&\qquad + 130a_0{}^3a_2b_0{}^3p^3\mu - 3a_0a_1{}^3b_0{}^4p^3\mu + 51a_0{}^2a_1a_2b_0{}^4p^3\mu \\
&\qquad + 40a_0{}^3a_1b_1p^3\mu + 180a_0{}^2a_1{}^2b_0b_1p^3\mu + 440a_0{}^3a_2b_0b_1p^3\mu \\
&\qquad - 6a_0a_1{}^3b_0{}^2b_1p^3\mu + 762a_0{}^2a_1a_2b_0{}^2b_1p^3\mu + 3a_1{}^4b_0{}^3b_1p^3\mu \\
&\qquad - 60a_0a_1{}^2a_2b_0{}^3b_1p^3\mu + 90a_0{}^2a_2{}^2b_0{}^3b_1p^3\mu + 12a_0a_1{}^3b_1{}^2p^3\mu \\
&\qquad + 456a_0{}^2a_1a_2b_1{}^2p^3\mu + 14a_1{}^4b_0b_1{}^2p^3\mu - 60a_0a_1{}^2a_2b_0b_1{}^2p^3\mu \\
&\qquad + 360a_0{}^2a_2{}^2b_0b_1{}^2p^3\mu + 56a_1{}^3a_2b_0{}^2b_1{}^2p^3\mu - 420a_0a_1a_2{}^2b_0{}^2b_1{}^2p^3\mu \\
&\qquad + 44a_1{}^3a_2b_1{}^3p^3\mu - 240a_0a_1a_2{}^2b_1{}^3p^3\mu + 132a_1{}^2a_2{}^2b_0b_1{}^3p^3\mu \\
&\qquad - 240a_0a_2{}^3b_0b_1{}^3p^3\mu + 64a_1a_2{}^3b_1{}^4p^3\mu + 50a_0{}^3a_1b_0{}^2p^4\mu \\
&\qquad - 5a_0{}^2a_1{}^2b_0{}^3p^4\mu + 130a_0{}^3a_2b_0{}^3p^4\mu + a_0a_1{}^3b_0{}^4p^4\mu \\
&\qquad - 13a_0{}^2a_1a_2b_0{}^4p^4\mu + 40a_0{}^3a_1b_1p^4\mu + 20a_0{}^2a_1{}^2b_0b_1p^4\mu
\end{aligned}
$$

$$
\begin{aligned}
&+440a_0{}^3a_2b_0b_1p^4\mu+22a_0a_1{}^3b_0{}^2b_1p^4\mu-46a_0{}^2a_1a_2b_0{}^2b_1p^4\mu-a_1{}^4b_0{}^3b_1p^4\mu\\
&\quad+52a_0a_1{}^2a_2b_0{}^3b_1p^4\mu-230a_0{}^2a_2{}^2b_0{}^3b_1p^4\mu+16a_0a_1{}^3b_1{}^2p^4\mu\\
&\quad+32a_0{}^2a_1a_2b_1{}^2p^4\mu-8a_1{}^4b_0b_1{}^2p^4\mu+176a_0a_1{}^2a_2b_0b_1{}^2p^4\mu\\
&\quad-640a_0{}^2a_2{}^2b_0b_1{}^2p^4\mu-28a_1{}^3a_2b_0{}^2b_1{}^2p^4\mu+188a_0a_1a_2{}^2b_0{}^2b_1{}^2p^4\mu\\
&\quad-32a_1{}^3a_2b_1{}^3p^4\mu+112a_0\,a_1a_2{}^2b_1{}^3p^4\mu-72a_1{}^2a_2{}^2b_0b_1{}^3p^4\mu\\
&\quad+240a_0a_2{}^3b_0b_1{}^3p^4\mu-24a_1a_2{}^3b_1{}^4p^4\mu
\end{aligned}
$$

$$
\begin{aligned}
e^{-4\phi(\xi)}:\;&a_1{}^4p^4w+12a_0a_1{}^2a_2p^4w+6a_0{}^2a_2{}^2p^4w+a_1{}^4p^5w+12a_0a_1{}^2a_2p^5w\\
&+6a_0{}^2a_2{}^2p^5w+a_1{}^4p^4\alpha+12a_0a_1{}^2a_2p^4\alpha+6a_0{}^2a_2{}^2p^4\alpha+a_1{}^4p^5\alpha\\
&+12a_0a_1{}^2a_2p^5\alpha+6a_0{}^2a_2{}^2p^5\alpha+5a_0a_1{}^4p^4\beta+30a_0{}^2a_1{}^2a_2p^4\beta\\
&+10a_0{}^3a_2{}^2p^4\beta-a_0{}^2a_1{}^2p^2w\gamma-4a_0a_1{}^3b_0p^2w\gamma-8a_0{}^2a_1a_2b_0p^2w\gamma\\
&-a_0a_1{}^4b_0{}^2p^2w\gamma-10a_0a_1{}^2a_2b_0{}^2p^2w\gamma-4a_0{}^2a_2{}^2b_0{}^2p^2w\gamma\\
&-2a_1{}^4b_1p^2w\gamma-20a_0a_1{}^2a_2b_1p^2w\gamma-8a_0{}^2a_2{}^2b_1p^2w\gamma\\
&-12a_1{}^3a_2b_0b_1p^2w\gamma-32a_0a_1a_2{}^2b_0b_1p^2w\gamma-13a_1{}^2a_2{}^2b_1{}^2p^2w\gamma\\
&-8a_0a_2{}^3b_1{}^2p^2w\gamma-6a_0{}^2a_1{}^2p^3w\gamma-6a_0{}^3a_2p^3w\gamma-9a_0a_1{}^3b_0p^3w\gamma\\
&-39a_0{}^2a_1a_2b_0p^3w\gamma-a_1{}^4b_0{}^2p^3w\gamma-18a_0a_1{}^2a_2b_0{}^2p^3w\gamma\\
&-12a_0{}^2a_2{}^2b_0{}^2p^3w\gamma-2a_1{}^4b_1p^3w\gamma-36a_0a_1{}^2a_2b_1p^3w\gamma\\
&-24a_0{}^2a_2{}^2b_1p^3w\gamma-9a_1{}^3a_2b_0b_1p^3w\gamma-39a_0a_1a_2{}^2b_0b_1p^3w\gamma\\
&-6a_1{}^2a_2{}^2b_1{}^2p^3w\gamma-6a_0a_2{}^3b_1{}^2p^3w\gamma-5a_0{}^2a_1{}^2p^4w\gamma\\
&-6a_0{}^3a_2p^4w\gamma-5a_0a_1{}^3b_0p^4w\gamma-31a_0{}^2a_1a_2b_0p^4w\gamma\\
&-8a_0a_1{}^2a_2b_0{}^2p^4w\gamma-8a_0{}^2a_2{}^2b_0{}^2p^4w\gamma-16a_0a_1{}^2a_2b_1p^4w\gamma\\
&-16a_0{}^2a_2{}^2b_1p^4w\gamma+3a_1{}^3a_2b_0b_1p^4w\gamma-7a_0a_1a_2{}^2b_0b_1p^4w\gamma\\
&+7a_1{}^2a_2{}^2b_1{}^2p^4w\gamma+2a_0a_2{}^3b_1{}^2p^4w\gamma+a_0{}^2a_1{}^2p^2\varepsilon+4a_0a_1{}^3b_0p^2\varepsilon\\
&+8a_0{}^2a_1a_2b_0p^2\varepsilon+a_1{}^4b_0{}^2p^2\varepsilon+10a_0a_1{}^2a_2b_0{}^2p^2\varepsilon+4a_0{}^2a_2{}^2b_0{}^2p^2\varepsilon\\
&+2a_1{}^4b_1p^2\varepsilon+20a_0a_1{}^2a_2b_1p^2\varepsilon+8a_0{}^2a_2{}^2b_1p^2\varepsilon+12a_1{}^3a_2b_0b_1p^2\varepsilon\\
&+32a_0a_1a_2{}^2b_0b_1p^2\varepsilon+13a_1{}^2a_2{}^2b_1{}^2p^2\varepsilon+8a_0a_2{}^3b_1{}^2p^2\varepsilon\\
&+6a_0{}^2a_1{}^2p^3\varepsilon+6a_0{}^3a_2p^3\varepsilon+9a_0a_1{}^3b_0p^3\varepsilon+39a_0{}^2a_1a_2b_0p^3\varepsilon\\
&+a_1{}^4b_0{}^2p^3\varepsilon+18a_0a_1{}^2a_2b_0{}^2p^3\varepsilon+12a_0{}^2a_2{}^2b_0{}^2p^3\varepsilon+2a_1{}^4b_1p^3\varepsilon\\
&+36a_0a_1{}^2a_2b_1p^3\varepsilon+24a_0{}^2a_2{}^2b_1p^3\varepsilon+9a_1{}^3a_2b_0b_1p^3\varepsilon\\
&+39a_0a_1a_2{}^2b_0b_1p^3\varepsilon
\end{aligned}
$$

$$
\begin{aligned}
&+6{a_1}^2{a_2}^2{b_1}^2p^3\varepsilon+6a_0{a_2}^3{b_1}^2p^3\varepsilon+5{a_0}^2{a_1}^2p^4\varepsilon+6{a_0}^3a_2p^4\varepsilon+5a_0{a_1}^3b_0p^4\varepsilon\\
&\quad+31{a_0}^2a_1a_2b_0p^4\varepsilon+8a_0{a_1}^2a_2{b_0}^2p^4\varepsilon+8{a_0}^2{a_2}^2{b_0}^2p^4\varepsilon\\
&\quad+16a_0{a_1}^2a_2b_1p^4\varepsilon+16{a_0}^2{a_2}^2b_1p^4\varepsilon-3{a_1}^3a_2b_0b_1p^4\varepsilon\\
&\quad+7a_0a_1{a_2}^2b_0b_1p^4\varepsilon-7{a_1}^2{a_2}^2{b_1}^2p^4\varepsilon-2a_0{a_2}^3{b_1}^2p^4\varepsilon+{a_1}^4{b_0}^4w\lambda\\
&\quad+12{a_1}^4{b_0}^2b_1w\lambda+32{a_1}^3a_2{b_0}^3b_1w\lambda+6{a_1}^4{b_1}^2w\lambda\\
&\quad+96{a_1}^3a_2b_0{b_1}^2w\lambda+144{a_1}^2{a_2}^2{b_0}^2{b_1}^2w\lambda+96{a_1}^2{a_2}^2{b_1}^3w\lambda\\
&\quad+128a_1{a_2}^3b_0{b_1}^3w\lambda+16{a_2}^4{b_1}^4w\lambda+30a_0{a_1}^3{b_0}^3pw\lambda+{a_1}^4{b_0}^4pw\lambda\\
&\quad+48a_0{a_1}^2a_2{b_0}^4pw\lambda+90a_0{a_1}^3b_0b_1pw\lambda+12{a_1}^4{b_0}^2b_1pw\lambda\\
&\quad+576a_0{a_1}^2a_2{b_0}^2b_1pw\lambda+14{a_1}^3a_2{b_0}^3b_1pw\lambda\\
&\quad+408a_0a_1{a_2}^2{b_0}^3b_1pw\lambda+6{a_1}^4{b_1}^2pw\lambda+288a_0{a_1}^2a_2{b_1}^2pw\lambda\\
&\quad+42{a_1}^3a_2b_0{b_1}^2pw\lambda+1224a_0a_1{a_2}^2b_0{b_1}^2pw\lambda\\
&\quad-36{a_1}^2{a_2}^2{b_0}^2{b_1}^2pw\lambda+432a_0{a_2}^3{b_0}^2{b_1}^2pw\lambda-24{a_1}^2{a_2}^2{b_1}^3pw\lambda\\
&\quad+288a_0{a_2}^3{b_1}^3pw\lambda-136a_1{a_2}^3b_0{b_1}^3pw\lambda-32{a_2}^4{b_1}^4pw\lambda\\
&\quad+115{a_0}^2{a_1}^2{b_0}^2p^2w\lambda+40a_0{a_1}^3{b_0}^3p^2w\lambda+380{a_0}^2a_1a_2{b_0}^3p^2w\lambda\\
&\quad+46a_0{a_1}^2a_2{b_0}^4p^2w\lambda+112{a_0}^2{a_2}^2{b_0}^4p^2w\lambda+80{a_0}^2{a_1}^2b_1p^2w\lambda\\
&\quad+140a_0{a_1}^3b_0b_1p^2w\lambda+1180{a_0}^2a_1a_2b_0b_1p^2w\lambda+10{a_1}^4{b_0}^2b_1p^2w\lambda\\
&\quad+652a_0{a_1}^2a_2{b_0}^2b_1p^2w\lambda+1384{a_0}^2{a_2}^2{b_0}^2b_1p^2w\lambda\\
&\quad+4{a_1}^3a_2{b_0}^3b_1p^2w\lambda+152a_0a_1{a_2}^2{b_0}^3b_1p^2w\lambda+10{a_1}^4{b_1}^2p^2w\lambda\\
&\quad+376a_0{a_1}^2a_2{b_1}^2p^2w\lambda+712{a_0}^2{a_2}^2{b_1}^2p^2w\lambda+72{a_1}^3a_2b_0{b_1}^2p^2w\lambda\\
&\quad+616a_0a_1{a_2}^2b_0{b_1}^2p^2w\lambda-53{a_1}^2{a_2}^2{b_0}^2{b_1}^2p^2w\lambda\\
&\quad-232a_0{a_2}^3{b_0}^2{b_1}^2p^2w\lambda+8\mathrm{a1}^2{a_2}^2{b_1}^3p^2w\lambda-128a_0{a_2}^3{b_1}^3p^2w\lambda\\
&\quad-92a_1{a_2}^3b_0{b_1}^3p^2w\lambda-4{a_2}^4{b_1}^4p^2w\lambda
\end{aligned}
$$

$$
\begin{aligned}
&+60a_0{}^3a_1b_0p^3w\lambda + 150a_0{}^2a_1{}^2b_0{}^2p^3w\lambda + 330a_0{}^3a_2b_0{}^2p^3w\lambda + 15a_0a_1{}^3b_0{}^3p^3w\lambda \\
&\quad + 435a_0{}^2a_1a_2b_0{}^3p^3w\lambda + 6a_0a_1{}^2a_2b_0{}^4p^3w\lambda + 48a_0{}^2a_2{}^2b_0{}^4p^3w\lambda \\
&\quad + 120a_0{}^2a_1{}^2b_1p^3w\lambda + 240a_0{}^3a_2b_1p^3w\lambda + 90a_0a_1{}^3b_0b_1p^3w\lambda \\
&\quad + 1500a_0{}^2a_1a_2b_0b_1p^3w\lambda + 10a_1{}^4b_0{}^2b_1p^3w\lambda \\
&\quad + 252a_0a_1{}^2a_2b_0{}^2b_1p^3w\lambda + 696a_0{}^2a_2{}^2b_0{}^2b_1p^3w\lambda \\
&\quad + 19a_1{}^3a_2b_0{}^3b_1p^3w\lambda - 225a_0a_1a_2{}^2b_0{}^3b_1p^3w\lambda + 10a_1{}^4b_1{}^2p^3w\lambda \\
&\quad + 216a_0a_1{}^2a_2b_1{}^2p^3w\lambda + 408a_0{}^2a_2{}^2b_1{}^2p^3w\lambda + 102a_1{}^3a_2b_0b_1{}^2p^3w\lambda \\
&\quad - 480a_0a_1a_2{}^2b_0b_1{}^2p^3w\lambda + 78a_1{}^2a_2{}^2b_0{}^2b_1{}^2p^3w\lambda \\
&\quad - 390a_0a_2{}^3b_0{}^2b_1{}^2p^3w\lambda + 72a_1{}^2a_2{}^2b_1{}^3p^3w\lambda - 240a_0a_2{}^3b_1{}^3p^3w\lambda \\
&\quad + 136a_1a_2{}^3b_0b_1{}^3p^3w\lambda + 32a_2{}^4b_1{}^4p^3w\lambda + 60a_0{}^3a_1b_0p^4w\lambda \\
&\quad + 35a_0{}^2a_1{}^2b_0{}^2p^4w\lambda + 330a_0{}^3a_2b_0{}^2p^4w\lambda + 5a_0a_1{}^3b_0{}^3p^4w\lambda \\
&\quad + 55a_0{}^2a_1a_2b_0{}^3p^4w\lambda + 8a_0a_1{}^2a_2b_0{}^4p^4w\lambda - 64a_0{}^2a_2{}^2b_0{}^4p^4w\lambda \\
&\quad + 40a_0{}^2a_1{}^2b_1p^4w\lambda + 240a_0{}^3a_2b_1p^4w\lambda + 40a_0a_1{}^3b_0b_1p^4w\lambda \\
&\quad + 320a_0{}^2a_1a_2b_0b_1p^4w\lambda + 176a_0a_1{}^2a_2b_0{}^2b_1p^4w\lambda \\
&\quad - 688a_0{}^2a_2{}^2b_0{}^2b_1p^4w\lambda - 3a_1{}^3a_2b_0{}^3b_1p^4w\lambda \\
&\quad + 31a_0a_1a_2{}^2b_0{}^3b_1p^4w\lambda + 128a_0a_1{}^2a_2b_1{}^2p^4w\lambda \\
&\quad - 304a_0{}^2a_2{}^2b_1{}^2p^4w\lambda - 24a_1{}^3a_2b_0b_1{}^2p^4w\lambda \\
&\quad + 128a_0a_1a_2{}^2b_0b_1{}^2p^4w\lambda - 49a_1{}^2a_2{}^2b_0{}^2b_1{}^2p^4w\lambda \\
&\quad + 274a_0a_2{}^3b_0{}^2b_1p^4w\lambda - 56a_1{}^2a_2{}^2b_1{}^3p^4w\lambda + 176a_0a_2{}^3b_1{}^3p^4w\lambda \\
&\quad - 36a_1a_2{}^3b_0b_1{}^3p^4w\lambda - 12a_2{}^4b_1{}^4p^4w\lambda + a_1{}^4b_0{}^4\mu + 12a_1{}^4b_0{}^2b_1\mu \\
&\quad + 32a_1{}^3a_2b_0{}^3b_1\mu + 6a_1{}^4b_1{}^2\mu + 96a_1{}^3a_2b_0b_1{}^2\mu + 144a_1{}^2a_2{}^2b_0{}^2b_1{}^2\mu \\
&\quad + 96a_1{}^2a_2{}^2b_1{}^3\mu + 128a_1a_2{}^3b_0b_1{}^3\mu + 16a_2{}^4b_1{}^4\mu + 30a_0a_1{}^3b_0{}^3p\mu \\
&\quad + a_1{}^4b_0{}^4p\mu + 48a_0a_1{}^2a_2b_0{}^4p\mu + 90a_0a_1{}^3b_0b_1p\mu + 12a_1{}^4b_0{}^2b_1p\mu \\
&\quad + 576a_0a_1{}^2a_2b_0{}^2b_1p\mu + 14a_1{}^3a_2b_0{}^3b_1p\mu + 408a_0a_1a_2{}^2b_0{}^3b_1p\mu \\
&\quad + 6a_1{}^4b_1{}^2p\mu + 288a_0a_1{}^2a_2b_1{}^2p\mu + 42a_1{}^3a_2b_0b_1{}^2p\mu \\
&\quad + 1224a_0a_1a_2{}^2b_0b_1{}^2p\mu - 36a_1{}^2a_2{}^2b_0{}^2b_1{}^2p\mu + 432a_0a_2{}^3b_0{}^2b_1{}^2p\mu \\
&\quad - 24a_1{}^2a_2{}^2b_1{}^3p\mu + 288a_0a_2{}^3b_1{}^3p\mu - 136a_1a_2{}^3b_0b_1{}^3p\mu \\
&\quad - 32a_2{}^4b_1{}^4p\mu + 115a_0{}^2a_1{}^2b_0{}^2p^2\mu + 40a_0a_1{}^3b_0{}^3p^2\mu \\
&\quad + 380a_0{}^2a_1a_2b_0{}^3p^2\mu + 46a_0a_1{}^2a_2b_0{}^4p^2\mu + 112a_0{}^2a_2{}^2b_0{}^4p^2\mu
\end{aligned}
$$

$$
\begin{aligned}
&+80a_0{}^2a_1{}^2b_1p^2\mu+140a_0a_1{}^3b_0b_1p^2\mu+1180a_0{}^2a_1a_2b_0b_1p^2\mu+10a_1{}^4b_0{}^2b_1p^2\mu\\
&\quad+652a_0a_1{}^2a_2b_0{}^2b_1p^2\mu+1384a_0{}^2a_2{}^2b_0{}^2b_1p^2\mu+4a_1{}^3a_2b_0{}^3b_1p^2\mu\\
&\quad+152a_0a_1a_2{}^2b_0{}^3b_1p^2\mu+10a_1{}^4b_1{}^2p^2\mu+376a_0a_1{}^2a_2b_1{}^2p^2\mu\\
&\quad+712a_0{}^2a_2{}^2b_1{}^2p^2\mu+72a_1{}^3a_2b_0b_1{}^2p^2\mu+616a_0a_1a_2{}^2b_0b_1{}^2p^2\mu\\
&\quad-53a_1{}^2a_2{}^2b_0{}^2b_1{}^2p^2\mu-232a_0a_2{}^3b_0{}^2b_1{}^2p^2\mu+8a_1{}^2a_2{}^2b_1{}^3p^2\mu\\
&\quad-128a_0a_2{}^3b_1{}^3p^2\mu-92a_1a_2{}^3b_0b_1{}^3p^2\mu-4a_2{}^4b_1{}^4p^2\mu\\
&\quad+60a_0{}^3a_1b_0p^3\mu+150a_0{}^2a_1{}^2b_0{}^2p^3\mu+330a_0{}^3a_2b_0{}^2p^3\mu\\
&\quad+15a_0a_1{}^3b_0{}^3p^3\mu+435a_0{}^2a_1a_2b_0{}^3p^3\mu+6a_0a_1{}^2a_2b_0{}^4p^3\mu\\
&\quad+48a_0{}^2a_2{}^2b_0{}^4p^3\mu+120a_0{}^2a_1{}^2b_1p^3\mu+240a_0{}^3a_2b_1p^3\mu\\
&\quad+90a_0a_1{}^3b_0b_1p^3\mu+1500a_0{}^2a_1a_2b_0b_1p^3\mu+10a_1{}^4b_0{}^2b_1p^3\mu\\
&\quad+252a_0a_1{}^2a_2b_0{}^2b_1p^3\mu+696a_0{}^2a_2{}^2b_0{}^2b_1p^3\mu+19a_1{}^3a_2b_0{}^3b_1p^3\mu\\
&\quad-225a_0a_1a_2{}^2b_0{}^3b_1p^3\mu+10a_1{}^4b_1{}^2p^3\mu+216a_0a_1{}^2a_2b_1{}^2p^3\mu\\
&\quad+408a_0{}^2a_2{}^2b_1{}^2p^3\mu+102a_1{}^3a_2b_0b_1{}^2p^3\mu-480a_0a_1a_2{}^2b_0b_1{}^2p^3\mu\\
&\quad+78a_1{}^2a_2{}^2b_0{}^2b_1{}^2p^3\mu-390a_0a_2{}^3b_0{}^2b_1{}^2p^3\mu+72a_1{}^2a_2{}^2b_1{}^3p^3\mu\\
&\quad-240a_0a_2{}^3b_1{}^3p^3\mu+136a_1a_2{}^3b_0b_1{}^3p^3\mu+32a_2{}^4b_1{}^4p^3\mu\\
&\quad+60a_0{}^3a_1b_0p^4\mu+35a_0{}^2a_1{}^2b_0{}^2p^4\mu+330a_0{}^3a_2b_0{}^2p^4\mu\\
&\quad+5a_0a_1{}^3b_0{}^3p^4\mu+55a_0{}^2a_1a_2b_0{}^3p^4\mu+8a_0a_1{}^2a_2b_0{}^4p^4\mu\\
&\quad-64a_0{}^2a_2{}^2b_0{}^4p^4\mu+40a_0{}^2a_1{}^2b_1p^4\mu+240a_0{}^3a_2b_1p^4\mu\\
&\quad+40a_0a_1{}^3b_0b_1p^4\mu+320a_0{}^2a_1a_2b_0b_1p^4\mu+176a_0a_1{}^2a_2b_0{}^2b_1p^4\mu\\
&\quad-688a_0{}^2a_2{}^2b_0{}^2b_1p^4\mu-3a_1{}^3a_2b_0{}^3b_1p^4\mu+31a_0a_1a_2{}^2b_0{}^3b_1p^4\mu\\
&\quad+128a_0a_1{}^2a_2b_1{}^2p^4\mu-304a_0{}^2a_2{}^2b_1{}^2p^4\mu-24\mathrm{a1}^3a_2b_0b_1{}^2p^4\mu\\
&\quad+128a_0a_1a_2{}^2b_0b_1{}^2p^4\mu-49a_1{}^2a_2{}^2b_0{}^2b_1{}^2p^4\mu+274a_0a_2{}^3b_0{}^2b_1{}^2p^4\mu\\
&\quad-56a_1{}^2a_2{}^2b_1{}^3p^4\mu+176a_0a_2{}^3b_1{}^3p^4\mu-36a_1a_2{}^3b_0b_1{}^3p^4\mu\\
&\quad-12a_2{}^4b_1{}^4p^4\mu
\end{aligned}
$$

$$
\begin{aligned}
e^{-5\phi(\xi)}\colon\ & 4{a_1}^3a_2p^4w + 12a_0a_1{a_2}^2p^4w + 4{a_1}^3a_2p^5w + 12a_0a_1{a_2}^2p^5w + 4{a_1}^3a_2p^4\alpha \\
& + 12a_0a_1{a_2}^2p^4\alpha + 4{a_1}^3a_2p^5\alpha + 12a_0a_1{a_2}^2p^5\alpha + {a_1}^5p^4\beta \\
& + 20a_0{a_1}^3a_2p^4\beta + 30{a_0}^2a_1{a_2}^2p^4\beta - 2a_0{a_1}^3p^2w\gamma - 4{a_0}^2a_1a_2p^2w\gamma \\
& - 2{a_1}^4b_0p^2w\gamma - 20a_0{a_1}^2a_2b_0p^2w\gamma - 8{a_0}^2{a_2}^2b_0p^2w\gamma \\
& - 6{a_1}^3a_2{b_0}^2p^2w\gamma - 16a_0a_1{a_2}^2{b_0}^2p^2w\gamma - 12{a_1}^3a_2b_1p^2w\gamma \\
& - 32a_0a_1{a_2}^2b_1p^2w\gamma - 26{a_1}^2{a_2}^2b_0b_1p^2w\gamma - 16a_0{a_2}^3b_0b_1p^2w\gamma \\
& - 12a_1{a_2}^3{b_1}^2p^2w\gamma - 6a_0{a_1}^3p^3w\gamma - 24{a_0}^2a_1a_2p^3w\gamma - 3{a_1}^4b_0p^3w\gamma \\
& - 48a_0{a_1}^2a_2b_0p^3w\gamma - 30{a_0}^2{a_2}^2b_0p^3w\gamma
\end{aligned}
$$

$$
\begin{aligned}
-7{a_1}^3a_2{b_0}^2p^3w\gamma & - 27a_0a_1{a_2}^2{b_0}^2p^3w\gamma - 14{a_1}^3a_2b_1p^3w\gamma - 54a_0a_1{a_2}^2b_1p^3w\gamma \\
& - 21{a_1}^2{a_2}^2b_0b_1p^3w\gamma - 18a_0{a_2}^3b_0b_1p^3w\gamma - 6a_1{a_2}^3{b_1}^2p^3w\gamma \\
& - 4a_0{a_1}^3p^4w\gamma - 20{a_0}^2a_1a_2p^4w\gamma - {a_1}^4b_0p^4w\gamma - 28a_0{a_1}^2a_2b_0p^4w\gamma \\
& - 22{a_0}^2{a_2}^2b_0p^4w\gamma - {a_1}^3a_2{b_0}^2p^4w\gamma - 11a_0a_1{a_2}^2{b_0}^2p^4w\gamma \\
& - 2{a_1}^3a_2b_1p^4w\gamma - 22a_0a_1{a_2}^2b_1p^4w\gamma + 5{a_1}^2{a_2}^2b_0b_1p^4w\gamma \\
& - 2a_0{a_2}^3b_0b_1p^4w\gamma + 6a_1{a_2}^3{b_1}^2p^4w\gamma + 2a_0{a_1}^3p^2\varepsilon + 4{a_0}^2a_1a_2p^2\varepsilon \\
& + 2{a_1}^4b_0p^2\varepsilon + 20a_0{a_1}^2a_2b_0p^2\varepsilon + 8{a_0}^2{a_2}^2b_0p^2\varepsilon + 6{a_1}^3a_2{b_0}^2p^2\varepsilon \\
& + 16a_0a_1{a_2}^2{b_0}^2p^2\varepsilon + 12{a_1}^3a_2b_1p^2\varepsilon + 32a_0a_1{a_2}^2b_1p^2\varepsilon \\
& + 26{a_1}^2{a_2}^2b_0b_1p^2\varepsilon + 16a_0{a_2}^3b_0b_1p^2\varepsilon + 12a_1{a_2}^3{b_1}^2p^2\varepsilon \\
& + 6a_0{a_1}^3p^3\varepsilon + 24{a_0}^2a_1a_2p^3\varepsilon + 3{a_1}^4b_0p^3\varepsilon + 48a_0{a_1}^2a_2b_0p^3\varepsilon \\
& + 30{a_0}^2{a_2}^2b_0p^3\varepsilon + 7{a_1}^3a_2{b_0}^2p^3\varepsilon + 27a_0a_1{a_2}^2{b_0}^2p^3\varepsilon \\
& + 14{a_1}^3a_2b_1p^3\varepsilon + 54a_0a_1{a_2}^2b_1p^3\varepsilon + 21{a_1}^2{a_2}^2b_0b_1p^3\varepsilon \\
& + 18a_0{a_2}^3b_0b_1p^3\varepsilon + 6a_1{a_2}^3{b_1}^2p^3\varepsilon + 4a_0{a_1}^3p^4\varepsilon + 20{a_0}^2a_1a_2p^4\varepsilon \\
& + {a_1}^4b_0p^4\varepsilon + 28a_0{a_1}^2a_2b_0p^4\varepsilon + 22{a_0}^2{a_2}^2b_0p^4\varepsilon + {a_1}^3a_2{b_0}^2p^4\varepsilon \\
& + 11a_0a_1{a_2}^2{b_0}^2p^4\varepsilon + 2{a_1}^3a_2b_1p^4\varepsilon + 22a_0a_1{a_2}^2b_1p^4\varepsilon \\
& - 5{a_1}^2{a_2}^2b_0b_1p^4\varepsilon + 2a_0{a_2}^3b_0b_1p^4\varepsilon - 6a_1{a_2}^3{b_1}^2p^4\varepsilon + 4{a_1}^4{b_0}^3w\lambda \\
& + 8{a_1}^3a_2{b_0}^4w\lambda + 12{a_1}^4b_0b_1w\lambda + 96{a_1}^3a_2{b_0}^2b_1w\lambda \\
& + 96{a_1}^2{a_2}^2{b_0}^3b_1w\lambda + 48{a_1}^3a_2{b_1}^2w\lambda
\end{aligned}
$$

$$
\begin{aligned}
&+288a_1{}^2a_2{}^2b_0b_1{}^2w\lambda+192a_1a_2{}^3b_0{}^2b_1{}^2w\lambda+128a_1a_2{}^3b_1{}^3w\lambda+64a_2{}^4b_0b_1{}^3w\lambda\\
&\quad+54a_0a_1b_0{}^2pw\lambda+10a_1{}^4b_0{}^3pw\lambda+228a_0a_1{}^2a_2b_0{}^3pw\lambda\\
&\quad+14a_1{}^3a_2b_0{}^4pw\lambda+120a_0a_1a_2{}^2b_0{}^4pw\lambda+36a_0a_1{}^3b_1pw\lambda\\
&\quad+30a_1{}^4b_0b_1pw\lambda+684a_0a_1{}^2a_2b_0b_1pw\lambda+168a_1{}^3a_2b_0{}^2b_1pw\lambda\\
&\quad+1440a_0a_1a_2{}^2b_0{}^2b_1pw\lambda+84a_1{}^2a_2{}^2b_0{}^3b_1pw\lambda\\
&\quad+336a_0a_2{}^3b_0{}^3b_1pw\lambda+84a_1{}^3a_2b_1{}^2pw\lambda+720a_0a_1a_2{}^2b_1{}^2pw\lambda\\
&\quad+252a_1{}^2a_2{}^2b_0b_1{}^2pw\lambda+1008a_0a_2{}^3b_0b_1{}^2pw\lambda-24a_1a_2{}^3b_0{}^2b_1{}^2pw\lambda\\
&\quad-16a_1a_2{}^3b_1{}^3pw\lambda-80a_2{}^4b_0b_1{}^3pw\lambda+108a_0{}^2a_1{}^2b_0p^2w\lambda\\
&\quad+122a_0a_1{}^3b_0{}^2p^2w\lambda+784a_0{}^2a_1a_2b_0{}^2p^2w\lambda+10a_1{}^4b_0{}^3p^2w\lambda\\
&\quad+404a_0a_1{}^2a_2b_0{}^3p^2w\lambda+608a_0{}^2a_2{}^2b_0{}^3p^2w\lambda+10a_1{}^3a_2b_0{}^4p^2w\lambda\\
&\quad+112a_0a_1a_2{}^2b_0{}^4p^2w\lambda+88a_0a_1{}^3b_1p^2w\lambda+536a_0{}^2a_1a_2b_1p^2w\lambda\\
&\quad+40a_1{}^4b_0b_1p^2w\lambda+1312a_0a_1{}^2a_2b_0b_1p^2w\lambda+1864a_0{}^2a_2{}^2b_0b_1p^2w\lambda\\
&\quad+180a_1{}^3a_2b_0{}^2b_1p^2w\lambda+1504a_0a_1a_2{}^2b_0{}^2b_1p^2w\lambda\\
&\quad+14a_1{}^2a_2{}^2b_0{}^3b_1p^2w\lambda-32a_0a_2{}^3b_0{}^3b_1p^2w\lambda+120a_1{}^3a_2b_1{}^2p^2w\lambda\\
&\quad+832a_0a_1a_2{}^2b_1{}^2p^2w\lambda+172a_1{}^2a_2{}^2b_0b_1{}^2p^2w\lambda\\
&\quad-16a_0a_2{}^3b_0b_1{}^2p^2w\lambda-144a_1a_2{}^3b_0{}^2b_1{}^2p^2w\lambda-56a_1a_2{}^3b_1{}^3p^2w\lambda\\
&\quad-40a_2{}^4b_0b_1{}^3p^2w\lambda+24a_0{}^3a_1p^3w\lambda+180a_0{}^2a_1{}^2b_0p^3w\lambda\\
&\quad+336a_0{}^3a_2b_0p^3w\lambda+96a_0a_1{}^3b_0{}^2p^3w\lambda+1140a_0{}^2a_1a_2b_0{}^2p^3w\lambda\\
&\quad+5a_1{}^4b_0{}^3p^3w\lambda+252a_0a_1{}^2a_2b_0{}^3p^3w\lambda+390a_0{}^2a_2{}^2b_0{}^3p^3w\lambda\\
&\quad+5a_1{}^3a_2b_0{}^4p^3w\lambda-21a_0a_1a_2{}^2b_0{}^4p^3w\lambda+84a_0a_1{}^3b_1p^3w\lambda\\
&\quad+840a_0{}^2a_1a_2b_1p^3w\lambda+30a_1{}^4b_0b_1p^3w\lambda+996a_0a_1{}^2a_2b_0b_1p^3w\lambda\\
&\quad+1320a_0{}^2a_2{}^2b_0b_1p^3w\lambda
\end{aligned}
$$

$$
\begin{aligned}
&+130a_1{}^3a_2b_0{}^2b_1p^3w\lambda + 18a_0a_1a_2{}^2b_0{}^2b_1p^3w\lambda + 9a_1{}^2a_2{}^2b_0{}^3b_1p^3w\lambda \\
&\quad - 246a_0a_2{}^3b_0{}^3b_1p^3w\lambda + 100a_1{}^3a_2b_1{}^2p^3w\lambda + 144a_0a_1a_2{}^2b_1{}^2p^3w\lambda \\
&\quad + 132a_1{}^2a_2{}^2b_0b_1{}^2p^3w\lambda - 648a_0a_2{}^3b_0b_1{}^2p^3w\lambda \\
&\quad + 66a_1a_2{}^3b_0{}^2b_1{}^2p^3w\lambda + 64a_1a_2{}^3b_1{}^3p^3w\lambda + 80a_2{}^4b_0b_1{}^3p^3w\lambda \\
&\quad + 24a_0{}^3a_1p^4w\lambda + 72a_0{}^2a_1{}^2b_0p^4w\lambda + 336a_0{}^3a_2b_0p^4w\lambda \\
&\quad + 28a_0a_1{}^3b_0{}^2p^4w\lambda + 356a_0{}^2a_1a_2b_0{}^2p^4w\lambda + a_1{}^4b_0{}^3p^4w\lambda \\
&\quad + 76a_0a_1{}^2a_2b_0{}^3p^4w\lambda - 218a_0{}^2a_2{}^2b_0{}^3p^4w\lambda + a_1{}^3a_2b_0{}^4p^4w\lambda \\
&\quad - 13a_0a_1a_2{}^2b_0{}^4p^4w\lambda + 32a_0a_1{}^3b_1p^4w\lambda + 304a_0{}^2a_1a_2b_1p^4w\lambda \\
&\quad + 8a_1{}^4b_0b_1p^4w\lambda + 368a_0a_1{}^2a_2b_0b_1p^4w\lambda - 544a_0{}^2a_2{}^2b_0b_1p^4w\lambda \\
&\quad + 22a_1{}^3a_2b_0{}^2b_1p^4w\lambda - 46a_0a_1a_2{}^2b_0{}^2b_1p^4w\lambda - 17a_1{}^2a_2{}^2b_0{}^3b_1p^4w\lambda \\
&\quad + 122a_0a_2{}^3b_0{}^3b_1p^4w\lambda + 16a_1{}^3a_2b_1{}^2p^4w\lambda + 32a_0a_1a_2{}^2b_1{}^2p^4w\lambda \\
&\quad - 76a_1{}^2a_2{}^2b_0b_1{}^2p^4w\lambda + 376a_0a_2{}^3b_0b_1{}^2p^4w\lambda - 6a_1a_2{}^3b_0{}^2b_1{}^2p^4w\lambda \\
&\quad - 24a_1a_2{}^3b_1{}^3p^4w\lambda - 24a_2{}^4b_0b_1{}^3p^4w\lambda + 4a_1{}^4b_0{}^3\mu + 8a_1{}^3a_2b_0{}^4\mu \\
&\quad + 12a_1{}^4b_0b_1\mu + 96a_1{}^3a_2b_0{}^2b_1\mu + 96a_1{}^2a_2{}^2b_0{}^3b_1\mu + 48a_1{}^3a_2b_1{}^2\mu \\
&\quad + 288a_1{}^2a_2{}^2b_0b_1{}^2\mu + 192a_1a_2{}^3b_0{}^2b_1{}^2\mu + 128a_1a_2{}^3b_1{}^3\mu \\
&\quad + 64a_2{}^4b_0b_1{}^3\mu + 54a_0a_1{}^3b_0{}^2p\mu + 10a_1{}^4b_0{}^3p\mu + 228a_0a_1{}^2a_2b_0{}^3p\mu \\
&\quad + 14a_1{}^3a_2b_0{}^4p\mu + 120a_0a_1a_2{}^2b_0{}^4p\mu + 36a_0a_1{}^3b_1p\mu \\
&\quad + 30a_1{}^4b_0b_1p\mu + 684a_0a_1{}^2a_2b_0b_1p\mu + 168a_1{}^3a_2b_0{}^2b_1p\mu \\
&\quad + 1440a_0a_1a_2{}^2b_0{}^2b_1p\mu + 84a_1{}^2a_2{}^2b_0{}^3b_1p\mu + 336a_0a_2{}^3b_0{}^3b_1p\mu \\
&\quad + 84a_1{}^3a_2b_1{}^2p\mu + 720a_0a_1a_2{}^2b_1{}^2p\mu + 252a_1{}^2a_2{}^2b_0b_1{}^2p\mu \\
&\quad + 1008a_0a_2{}^3b_0b_1{}^2p\mu - 24a_1a_2{}^3b_0{}^2b_1{}^2p\mu - 16a_1a_2{}^3b_1{}^3p\mu \\
&\quad - 80a_2{}^4b_0b_1{}^3p\mu + 108a_0{}^2a_1{}^2b_0p^2\mu + 122a_0a_1{}^3b_0{}^2p^2\mu \\
&\quad + 784a_0{}^2a_1a_2b_0{}^2p^2\mu + 10a_1{}^4b_0{}^3p^2\mu
\end{aligned}
$$

$$+404a_0{a_1}^2a_2{b_0}^3p^2\mu + 608{a_0}^2{a_2}^2{b_0}^3p^2\mu + 10{a_1}^3a_2{b_0}^4p^2\mu + 112a_0a_1{a_2}^2{b_0}^4p^2\mu$$
$$+ 88a_0{a_1}^3b_1p^2\mu + 536{a_0}^2a_1a_2b_1p^2\mu + 40{a_1}^4b_0b_1p^2\mu$$
$$+ 1312a_0{a_1}^2a_2b_0b_1p^2\mu + 1864{a_0}^2{a_2}^2b_0b_1p^2\mu + 180{a_1}^3a_2{b_0}^2b_1p^2\mu$$
$$+ 1504a_0a_1{a_2}^2{b_0}^2b_1p^2\mu + 14{a_1}^2{a_2}^2{b_0}^3b_1p^2\mu - 32a_0{a_2}^3{b_0}^3b_1p^2\mu$$
$$+ 120{a_1}^3a_2{b_1}^2p^2\mu + 832a_0a_1{a_2}^2{b_1}^2p^2\mu + 172{a_1}^2{a_2}^2b_0{b_1}^2p^2\mu$$
$$- 16a_0{a_2}^3b_0{b_1}^2p^2\mu - 144a_1{a_2}^3{b_0}^2{b_1}^2p^2\mu - 56a_1{a_2}^3{b_1}^3p^2\mu$$
$$- 40{a_2}^4b_0{b_1}^3p^2\mu + 24{a_0}^3a_1p^3\mu + 180{a_0}^2{a_1}^2b_0p^3\mu$$
$$+ 336{a_0}^3a_2b_0p^3\mu + 96a_0{a_1}^3{b_0}^2p^3\mu + 1140{a_0}^2a_1a_2{b_0}^2p^3\mu$$
$$+ 5{a_1}^4{b_0}^3p^3\mu + 252a_0{a_1}^2a_2{b_0}^3p^3\mu + 390{a_0}^2{a_2}^2{b_0}^3p^3\mu$$
$$+ 5{a_1}^3a_2{b_0}^4p^3\mu - 21a_0a_1{a_2}^2{b_0}^4p^3\mu + 84a_0{a_1}^3b_1p^3\mu$$
$$+ 840{a_0}^2a_1a_2b_1p^3\mu + 30{a_1}^4b_0b_1p^3\mu + 996a_0{a_1}^2a_2b_0b_1p^3\mu$$
$$+ 1320{a_0}^2{a_2}^2b_0b_1p^3\mu + 130{a_1}^3a_2{b_0}^2b_1p^3\mu + 18a_0a_1{a_2}^2{b_0}^2b_1p^3\mu$$
$$+ 9{a_1}^2{a_2}^2{b_0}^3b_1p^3\mu - 246a_0{a_2}^3{b_0}^3b_1p^3\mu + 100{a_1}^3a_2{b_1}^2p^3\mu$$
$$+ 144a_0a_1{a_2}^2{b_1}^2p^3\mu + 132{a_1}^2{a_2}^2b_0{b_1}^2p^3\mu - 648a_0{a_2}^3b_0{b_1}^2p^3\mu$$
$$+ 66a_1{a_2}^3{b_0}^2{b_1}^2p^3\mu + 64a_1{a_2}^3{b_1}^3p^3\mu + 80{a_2}^4b_0{b_1}^3p^3\mu$$
$$+ 24{a_0}^3a_1p^4\mu + 72{a_0}^2{a_1}^2b_0p^4\mu + 336{a_0}^3a_2b_0p^4\mu$$
$$+ 28a_0{a_1}^3{b_0}^2p^4\mu + 356{a_0}^2a_1a_2{b_0}^2p^4\mu + {a_1}^4{b_0}^3p^4\mu$$
$$+ 76a_0{a_1}^2a_2{b_0}^3p^4\mu - 218{a_0}^2{a_2}^2{b_0}^3p^4\mu + {a_1}^3a_2{b_0}^4p^4\mu$$
$$- 13a_0a_1{a_2}^2{b_0}^4p^4\mu + 32a_0{a_1}^3b_1p^4\mu + 304{a_0}^2a_1a_2b_1p^4\mu$$
$$+ 8{a_1}^4b_0b_1p^4\mu + 368a_0{a_1}^2a_2b_0b_1p^4\mu - 544{a_0}^2{a_2}^2b_0b_1p^4\mu$$
$$+ 22{a_1}^3a_2{b_0}^2b_1p^4\mu - 46a_0a_1{a_2}^2{b_0}^2b_1p^4\mu - 17{a_1}^2{a_2}^2{b_0}^3b_1p^4\mu$$
$$+ 122a_0{a_2}^3{b_0}^3b_1p^4\mu + 16{a_1}^3a_2{b_1}^2p^4\mu + 32a_0a_1{a_2}^2{b_1}^2p^4\mu$$
$$- 76{a_1}^2{a_2}^2b_0{b_1}^2p^4\mu + 376a_0{a_2}^3b_0{b_1}^2p^4\mu - 6a_1{a_2}^3{b_0}^2{b_1}^2p^4\mu$$
$$- 24a_1{a_2}^3{b_1}^3p^4\mu - 24{a_2}^4b_0{b_1}^3p^4\mu$$

$$
\begin{aligned}
e^{-6\phi(\xi)}&: 6{a_1}^2{a_2}^2p^4w+4a_0{a_2}^3p^4w+6{a_1}^2{a_2}^2p^5w+4a_0{a_2}^3p^5w+6{a_1}^2{a_2}^2p^4\alpha\\
&+4a_0{a_2}^3p^4\alpha+6{a_1}^2{a_2}^2p^5\alpha+4a_0{a_2}^3p^5\alpha+5{a_1}^4a_2p^4\beta\\
&+30a_0{a_1}^2{a_2}^2p^4\beta+10{a_0}^2{a_2}^3p^4\beta-{a_1}^4p^2w\gamma-10a_0{a_1}^2a_2p^2w\gamma\\
&-4{a_0}^2{a_2}^2p^2w\gamma-12{a_1}^3a_2b_0p^2w\gamma-32a_0a_1{a_2}^2b_0p^2w\gamma\\
&-13{a_1}^2{a_2}^2{b_0}^2p^2w\gamma-8a_0{a_2}^3{b_0}^2p^2w\gamma-26{a_1}^2{a_2}^2b_1p^2w\gamma\\
&-16a_0{a_2}^3b_1p^2w\gamma-24a_1{a_2}^3b_0b_1p^2w\gamma-4{a_2}^4{b_1}^2p^2w\gamma-2{a_1}^4p^3w\gamma\\
&-30a_0{a_1}^2a_2p^3w\gamma-18{a_0}^2{a_2}^2p^3w\gamma-19{a_1}^3a_2b_0p^3w\gamma\\
&-69a_0a_1{a_2}^2b_0p^3w\gamma-15{a_1}^2{a_2}^2{b_0}^2p^3w\gamma-12a_0{a_2}^3{b_0}^2p^3w\gamma-30{a_1}^2{a_2}^2b_1p^3w\gamma\\
&-24a_0{a_2}^3b_1p^3w\gamma-19a_1{a_2}^3b_0b_1p^3w\gamma-2{a_2}^4{b_1}^2p^3w\gamma-{a_1}^4p^4w\gamma\\
&-20a_0{a_1}^2a_2p^4w\gamma-14{a_0}^2{a_2}^2p^4w\gamma-7{a_1}^3a_2b_0p^4w\gamma\\
&-37a_0a_1{a_2}^2b_0p^4w\gamma-2{a_1}^2{a_2}^2{b_0}^2p^4w\gamma-4a_0{a_2}^3{b_0}^2p^4w\gamma\\
&-4{a_1}^2{a_2}^2b_1p^4w\gamma-8a_0{a_2}^3b_1p^4w\gamma+5a_1{a_2}^3b_0b_1p^4w\gamma\\
&+2{a_2}^4{b_1}^2p^4w\gamma+{a_1}^4p^2\varepsilon+10a_0{a_1}^2a_2p^2\varepsilon+4{a_0}^2{a_2}^2p^2\varepsilon\\
&+12{a_1}^3a_2b_0p^2\varepsilon+32a_0a_1{a_2}^2b_0p^2\varepsilon+13{a_1}^2{a_2}^2{b_0}^2p^2\varepsilon\\
&+8a_0{a_2}^3{b_0}^2p^2\varepsilon+26{a_1}^2{a_2}^2b_1p^2\varepsilon+16a_0{a_2}^3b_1p^2\varepsilon\\
&+24a_1{a_2}^3b_0b_1p^2\varepsilon+4{a_2}^4{b_1}^2p^2\varepsilon+2{a_1}^4p^3\varepsilon+30a_0{a_1}^2a_2p^3\varepsilon\\
&+18{a_0}^2{a_2}^2p^3\varepsilon+19{a_1}^3a_2b_0p^3\varepsilon+69a_0a_1{a_2}^2b_0p^3\varepsilon\\
&+15{a_1}^2{a_2}^2{b_0}^2p^3\varepsilon+12a_0{a_2}^3{b_0}^2p^3\varepsilon+30{a_1}^2{a_2}^2b_1p^3\varepsilon\\
&+24a_0{a_2}^3b_1p^3\varepsilon+19a_1{a_2}^3b_0b_1p^3\varepsilon+2{a_2}^4{b_1}^2p^3\varepsilon+{a_1}^4p^4\varepsilon\\
&+20a_0{a_1}^2a_2p^4\varepsilon+14{a_0}^2{a_2}^2p^4\varepsilon+7{a_1}^3a_2b_0p^4\varepsilon+37a_0a_1{a_2}^2b_0p^4\varepsilon\\
&+2{a_1}^2{a_2}^2{b_0}^2p^4\varepsilon+4a_0{a_2}^3{b_0}^2p^4\varepsilon+4{a_1}^2{a_2}^2b_1p^4\varepsilon+8a_0{a_2}^3b_1p^4\varepsilon\\
&-5a_1{a_2}^3b_0b_1p^4\varepsilon-2{a_2}^4{b_1}^2p^4\varepsilon+6{a_1}^4{b_0}^2w\lambda+32{a_1}^3a_2{b_0}^3w\lambda\\
&+24{a_1}^2{a_2}^2{b_0}^4w\lambda+4{a_1}^4b_1w\lambda+96{a_1}^3a_2b_0b_1w\lambda\\
&+288{a_1}^2{a_2}^2{b_0}^2b_1w\lambda+128a_1{a_2}^3{b_0}^3b_1w\lambda+144{a_1}^2{a_2}^2{b_1}^2w\lambda
\end{aligned}
$$

$$
\begin{aligned}
+384a_1a_2{}^3b_0b_1{}^2w\lambda + 96a_2{}^4b_0{}^2b_1{}^2w\lambda + 64a_2{}^4b_1{}^3w\lambda + 42a_0a_1{}^3b_0pw\lambda \\
+ 24a_1{}^4b_0{}^2pw\lambda + 396a_0a_1{}^2a_2b_0{}^2pw\lambda + 98a_1{}^3a_2b_0{}^3pw\lambda \\
+ 552a_0a_1a_2{}^2b_0{}^3pw\lambda + 48a_1{}^2a_2{}^2b_0{}^4pw\lambda + 96a_0a_2{}^3b_0{}^4pw\lambda \\
+ 16a_1{}^4b_1pw\lambda + 264a_0a_1{}^2a_2b_1pw\lambda + 294a_1{}^3a_2b_0b_1pw\lambda \\
+ 1656a_0a_1a_2{}^2b_0b_1pw\lambda + 576a_1{}^2a_2{}^2b_0{}^2b_1pw\lambda \\
+ 1152a_0a_2{}^3b_0{}^2b_1pw\lambda + 104a_1a_2{}^3b_0{}^3b_1pw\lambda + 288a_1{}^2a_2{}^2b_1{}^2pw\lambda \\
+ 576a_0a_2{}^3b_1{}^2pw\lambda + 312a_1a_2{}^3b_0b_1{}^2pw\lambda - 48a_2{}^4b_0{}^2b_1{}^2pw\lambda \\
- 32a_2{}^4b_1{}^3pw\lambda + 36a_0{}^2a_1{}^2p^2w\lambda + 132a_0a_1{}^3b_0p^2w\lambda \\
+ 684a_0{}^2a_1a_2b_0p^2w\lambda + 37a_1{}^4b_0{}^2p^2w\lambda + 1006a_0a_1{}^2a_2b_0{}^2p^2w\lambda \\
+ 1180a_0{}^2a_2{}^2b_0{}^2p^2w\lambda + 124a_1{}^3a_2b_0{}^3p^2w\lambda + 872a_0a_1a_2{}^2b_0{}^3p^2w\lambda \\
+ 31a_1{}^2a_2{}^2b_0{}^4p^2w\lambda + 32a_0a_2{}^3b_0{}^4p^2w\lambda + 28a_1{}^4b_1p^2w\lambda \\
+ 704a_0a_1{}^2a_2b_1p^2w\lambda + 800a_0{}^2a_2{}^2b_1p^2w\lambda + 432a_1{}^3a_2b_0b_1p^2w\lambda \\
+ 2776a_0a_1a_2{}^2b_0b_1p^2w\lambda + 502a_1{}^2a_2{}^2b_0{}^2b_1p^2w\lambda \\
+ 464a_0a_2{}^3b_0{}^2b_1p^2w\lambda - 44a_1a_2{}^3b_0{}^3b_1p^2w\lambda + 316a_1{}^2a_2{}^2b_1{}^2p^2w\lambda \\
+ 272a_0a_2{}^3b_1{}^2p^2w\lambda - 12a_1a_2{}^3b_0b_1{}^2p^2w\lambda - 68a_2{}^4b_0{}^2b_1{}^2p^2w\lambda \\
- 32a_2{}^4b_1{}^3p^2w\lambda + 72a_0{}^2a_1{}^2p^3w\lambda + 120a_0{}^3a_2p^3w\lambda
\end{aligned}
$$

$$+138a_0{a_1}^3b_0p^3w\lambda + 1188{a_0}^2a_1a_2b_0p^3w\lambda + 26{a_1}^4{b_0}^2p^3w\lambda$$
$$+ 894a_0{a_1}^2a_2{b_0}^2p^3w\lambda + 990{a_0}^2{a_2}^2{b_0}^2p^3w\lambda + 77{a_1}^3a_2{b_0}^3p^3w\lambda$$
$$+ 273a_0a_1{a_2}^2{b_0}^3p^3w\lambda + 3{a_1}^2{a_2}^2{b_0}^4p^3w\lambda - 48a_0{a_2}^3{b_0}^4p^3w\lambda$$
$$+ 24{a_1}^4b_1p^3w\lambda + 696a_0{a_1}^2a_2b_1p^3w\lambda + 720{a_0}^2{a_2}^2b_1p^3w\lambda$$
$$+ 326{a_1}^3a_2b_0b_1p^3w\lambda + 1164a_0a_1{a_2}^2b_0b_1p^3w\lambda$$
$$+ 186{a_1}^2{a_2}^2{b_0}^2b_1p^3w\lambda - 456a_0{a_2}^3{b_0}^2b_1p^3w\lambda$$
$$- 13a_1{a_2}^3{b_0}^3b_1p^3w\lambda + 168{a_1}^2{a_2}^2{b_1}^2p^3w\lambda - 168a_0{a_2}^3{b_1}^2p^3w\lambda$$
$$+ 56a_1{a_2}^3b_0{b_1}^2p^3w\lambda + 62{a_2}^4{b_0}^2{b_1}^2p^3w\lambda + 48{a_2}^4{b_1}^3p^3w\lambda$$
$$+ 36{a_0}^2{a_1}^2p^4w\lambda + 120{a_0}^3a_2p^4w\lambda + 48a_0{a_1}^3b_0p^4w\lambda$$
$$+ 504{a_0}^2a_1a_2b_0p^4w\lambda + 7{a_1}^4{b_0}^2p^4w\lambda + 284a_0{a_1}^2a_2{b_0}^2p^4w\lambda$$
$$- 190{a_0}^2{a_2}^2{b_0}^2p^4w\lambda + 19{a_1}^3a_2{b_0}^3p^4w\lambda - 47a_0a_1{a_2}^2{b_0}^3p^4w\lambda$$
$$- 4{a_1}^2{a_2}^2{b_0}^4p^4w\lambda + 16a_0{a_2}^3{b_0}^4p^4w\lambda + 8{a_1}^4b_1p^4w\lambda$$
$$+ 256a_0{a_1}^2a_2b_1p^4w\lambda - 80{a_0}^2{a_2}^2b_1p^4w\lambda + 92{a_1}^3a_2b_0b_1p^4w\lambda$$
$$+ 44a_0a_1{a_2}^2b_0b_1p^4w\lambda - 28{a_1}^2{a_2}^2{b_0}^2b_1p^4w\lambda$$
$$+ 232a_0{a_2}^3{b_0}^2b_1p^4w\lambda + 7a_1{a_2}^3{b_0}^3b_1p^4w\lambda - 4{a_1}^2{a_2}^2{b_1}^2p^4w\lambda$$
$$+ 136a_0{a_2}^3{b_1}^2p^4w\lambda - 4a_1{a_2}^3b_0{b_1}^2p^4w\lambda - 14{a_2}^4{b_0}^2{b_1}^2p^4w\lambda$$
$$- 16{a_2}^4{b_1}^3p^4w\lambda + 6{a_1}^4{b_0}^2\mu + 32{a_1}^3a_2{b_0}^3\mu + 24{a_1}^2{a_2}^2{b_0}^4\mu$$
$$+ 4{a_1}^4b_1\mu + 96{a_1}^3a_2b_0b_1\mu + 288{a_1}^2{a_2}^2{b_0}^2b_1\mu + 128a_1{a_2}^3{b_0}^3b_1\mu$$
$$+ 144{a_1}^2{a_2}^2{b_1}^2\mu + 384a_1{a_2}^3b_0{b_1}^2\mu + 96{a_2}^4{b_0}^2{b_1}^2\mu + 64{a_2}^4{b_1}^3\mu$$
$$+ 42a_0{a_1}^3b_0p\mu + 24{a_1}^4{b_0}^2p\mu + 396a_0{a_1}^2a_2{b_0}^2p\mu + 98{a_1}^3a_2{b_0}^3p\mu$$
$$+ 552a_0a_1{a_2}^2{b_0}^3p\mu + 48{a_1}^2{a_2}^2{b_0}^4p\mu + 96a_0{a_2}^3{b_0}^4p\mu$$
$$+ 16{a_1}^4b_1p\mu + 264a_0{a_1}^2a_2b_1p\mu + 294{a_1}^3a_2b_0b_1p\mu$$
$$+ 1656a_0a_1{a_2}^2b_0b_1p\mu + 576{a_1}^2{a_2}^2{b_0}^2b_1p\mu + 1152a_0{a_2}^3{b_0}^2b_1p\mu$$
$$+ 104a_1{a_2}^3{b_0}^3b_1p\mu + 288{a_1}^2{a_2}^2{b_1}^2p\mu$$

$$+576a_0{a_2}^3{b_1}^2p\mu + 312a_1{a_2}^3b_0{b_1}^2p\mu - 48{a_2}^4{b_0}^2{b_1}^2p\mu - 32{a_2}^4{b_1}^3p\mu$$
$$+ 36{a_0}^2{a_1}^2p^2\mu + 132a_0{a_1}^3b_0p^2\mu + 684{a_0}^2a_1a_2b_0p^2\mu$$
$$+ 37{a_1}^4{b_0}^2p^2\mu + 1006a_0{a_1}^2a_2{b_0}^2p^2\mu + 1180{a_0}^2{a_2}^2{b_0}^2p^2\mu$$
$$+ 124{a_1}^3a_2{b_0}^3p^2\mu + 872a_0a_1{a_2}^2{b_0}^3p^2\mu + 31{a_1}^2{a_2}^2{b_0}^4p^2\mu$$
$$+ 32a_0{a_2}^3{b_0}^4p^2\mu + 28{a_1}^4b_1p^2\mu + 704a_0{a_1}^2a_2b_1p^2\mu$$
$$+ 800{a_0}^2{a_2}^2b_1p^2\mu + 432{a_1}^3a_2b_0b_1p^2\mu + 2776a_0a_1{a_2}^2b_0b_1p^2\mu$$
$$+ 502{a_1}^2{a_2}^2{b_0}^2b_1p^2\mu + 464a_0{a_2}^3{b_0}^2b_1p^2\mu - 44a_1{a_2}^3{b_0}^3b_1p^2\mu$$
$$+ 316{a_1}^2{a_2}^2{b_1}^2p^2\mu + 272a_0{a_2}^3{b_1}^2p^2\mu - 12a_1{a_2}^3b_0{b_1}^2p^2\mu$$
$$- 68{a_2}^4{b_0}^2{b_1}^2p^2\mu - 32{a_2}^4{b_1}^3p^2\mu + 72{a_0}^2{a_1}^2p^3\mu + 120{a_0}^3a_2p^3\mu$$
$$+138a_0{a_1}^3b_0p^3\mu + 1188{a_0}^2a_1a_2b_0p^3\mu + 26{a_1}^4{b_0}^2p^3\mu + 894a_0{a_1}^2a_2{b_0}^2p^3\mu$$
$$+ 990{a_0}^2{a_2}^2{b_0}^2p^3\mu + 77\mathrm{a}{a_1}^3a_2{b_0}^3p^3\mu + 273a_0a_1{a_2}^2{b_0}^3p^3\mu$$
$$+ 3{a_1}^2{a_2}^2{b_0}^4p^3\mu - 48a_0{a_2}^3{b_0}^4p^3\mu + 24{a_1}^4b_1p^3\mu$$
$$+ 696a_0{a_1}^2a_2b_1p^3\mu + 720{a_0}^2{a_2}^2b_1p^3\mu + 326{a_1}^3a_2b_0b_1p^3\mu$$
$$+ 1164a_0a_1{a_2}^2b_0b_1p^3\mu + 186{a_1}^2{a_2}^2{b_0}^2b_1p^3\mu - 456a_0{a_2}^3{b_0}^2b_1p^3\mu$$
$$- 13a_1{a_2}^3{b_0}^3b_1p^3\mu + 168{a_1}^2{a_2}^2{b_1}^2p^3\mu - 168a_0{a_2}^3{b_1}^2p^3\mu$$
$$+ 56a_1{a_2}^3b_0{b_1}^2p^3\mu + 62{a_2}^4{b_0}^2{b_1}^2p^3\mu + 48{a_2}^4{b_1}^3p^3\mu$$
$$+ 36{a_0}^2{a_1}^2p^4\mu + 120{a_0}^3a_2p^4\mu + 48a_0{a_1}^3b_0p^4\mu$$
$$+ 504{a_0}^2a_1a_2b_0p^4\mu + 7{a_1}^4{b_0}^2p^4\mu + 284a_0{a_1}^2a_2{b_0}^2p^4\mu$$
$$- 190{a_0}^2{a_2}^2{b_0}^2p^4\mu + 19{a_1}^3a_2{b_0}^3p^4\mu - 47a_0a_1{a_2}^2{b_0}^3p^4\mu$$
$$- 4{a_1}^2{a_2}^2{b_0}^4p^4\mu + 16a_0{a_2}^3{b_0}^4p^4\mu + 8{a_1}^4b_1p^4\mu$$
$$+ 256a_0{a_1}^2a_2b_1p^4\mu - 80{a_0}^2{a_2}^2b_1p^4\mu + 92{a_1}^3a_2b_0b_1p^4\mu$$
$$+ 44a_0a_1{a_2}^2b_0b_1p^4\mu - 28{a_1}^2{a_2}^2{b_0}^2b_1p^4\mu + 232a_0{a_2}^3{b_0}^2b_1p^4\mu$$
$$+ 7a_1{a_2}^3{b_0}^3b_1p^4\mu - 4{a_1}^2{a_2}^2{b_1}^2p^4\mu + 136a_0{a_2}^3{b_1}^2p^4\mu$$
$$- 4a_1{a_2}^3b_0{b_1}^2p^4\mu - 14{a_2}^4{b_0}^2{b_1}^2p^4\mu - 16{a_2}^4{b_1}^3p^4\mu$$

$$
\begin{aligned}
e^{-7\phi(\xi)}:\ & 4a_1a_2{}^3p^4w + 4a_1a_2{}^3p^5w + 4a_1a_2{}^3p^4\alpha + 4a_1a_2{}^3p^5\alpha + 10a_1{}^3a_2{}^2p^4\beta \\
& + 20a_0a_1a_2{}^3p^4\beta - 6a_1{}^3a_2p^2w\gamma - 16a_0a_1a_2{}^2p^2w\gamma \\
& - 26a_1{}^2a_2{}^2b_0p^2w\gamma - 16a_0a_2{}^3b_0p^2w\gamma - 12a_1a_2{}^3b_0{}^2p^2w\gamma \\
& - 24a_1a_2{}^3b_1p^2w\gamma - 8\mathrm{a}2^4b_0b_1p^2w\gamma - 12a_1{}^3a_2p^3w\gamma \\
& - 42a_0a_1a_2{}^2p^3w\gamma - 39a_1{}^2a_2{}^2b_0p^3w\gamma - 30a_0a_2{}^3b_0p^3w\gamma \\
& - 13a_1a_2{}^3b_0{}^2p^3w\gamma - 26a_1a_2{}^3b_1p^3w\gamma - 6a_2{}^4b_0b_1p^3w\gamma \\
& - 6a_1{}^3a_2p^4w\gamma - 26a_0a_1a_2{}^2p^4w\gamma - 13a_1{}^2a_2{}^2b_0p^4w\gamma \\
& - 14a_0a_2{}^3b_0p^4w\gamma - a_1a_2{}^3b_0{}^2p^4w\gamma - 2a_1a_2{}^3b_1p^4w\gamma \\
& + 2a_2{}^4b_0b_1p^4w\gamma + 6a_1{}^3a_2p^2\varepsilon + 16a_0a_1a_2{}^2p^2\varepsilon + 26a_1{}^2a_2{}^2b_0p^2\varepsilon \\
& + 16a_0a_2{}^3b_0p^2\varepsilon + 12a_1a_2{}^3b_0{}^2p^2\varepsilon + 24a_1a_2{}^3b_1p^2\varepsilon + 8a_2{}^4b_0b_1p^2\varepsilon \\
& + 12a_1{}^3a_2p^3\varepsilon + 42a_0a_1a_2{}^2p^3\varepsilon + 39a_1{}^2a_2{}^2b_0p^3\varepsilon + 30a_0a_2{}^3b_0p^3\varepsilon \\
& + 13a_1a_2{}^3b_0{}^2p^3\varepsilon + 26a_1a_2{}^3b_1p^3\varepsilon + 6a_2{}^4b_0b_1p^3\varepsilon + 6a_1{}^3a_2p^4\varepsilon \\
& + 26a_0a_1a_2{}^2p^4\varepsilon + 13a_1{}^2a_2{}^2b_0p^4\varepsilon + 14a_0a_2{}^3b_0p^4\varepsilon + a_1a_2{}^3b_0{}^2p^4\varepsilon \\
& + 2a_1a_2{}^3b_1p^4\varepsilon - 2a_2{}^4b_0b_1p^4\varepsilon + 4a_1{}^4b_0w\lambda + 48a_1{}^3a_2b_0{}^2w\lambda \\
& + 96a_1{}^2a_2{}^2b_0{}^3w\lambda + 32a_1a_2{}^3b_0{}^4w\lambda + 32a_1{}^3a_2b_1w\lambda \\
& + 288a_1{}^2a_2{}^2b_0b_1w\lambda + 384a_1a_2{}^3b_0{}^2b_1w\lambda + 64a_2{}^4b_0{}^3b_1w\lambda \\
& + 192a_1a_2{}^3b_1{}^2w\lambda + 192a_2{}^4b_0b_1{}^2w\lambda + 12a_0a_1{}^3pw\lambda + 22a_1{}^4b_0pw\lambda \\
& + 300a_0a_1{}^2a_2b_0pw\lambda + 210a_1{}^3a_2b_0{}^2pw\lambda + 936a_0a_1a_2{}^2b_0{}^2pw\lambda \\
& + 300a_1{}^2a_2{}^2b_0{}^3pw\lambda
\end{aligned}
$$

$$+432a_0a_2{}^3b_0{}^3pw\lambda + 56a_1a_2{}^3b_0{}^4pw\lambda + 140a_1{}^3a_2b_1pw\lambda + 624a_0a_1a_2{}^2b_1pw\lambda$$
$$+ 900a_1{}^2a_2{}^2b_0b_1pw\lambda + 1296a_0a_2{}^3b_0b_1pw\lambda + 672a_1a_2{}^3b_0{}^2b_1pw\lambda$$
$$+ 16a_2{}^4b_0{}^3b_1pw\lambda + 336a_1a_2{}^3b_1{}^2pw\lambda + 48a_2{}^4b_0b_1{}^2pw\lambda$$
$$+ 48a_0a_1{}^3p^2w\lambda + 216a_0{}^2a_1a_2p^2w\lambda + 44a_1{}^4b_0p^2w\lambda$$
$$+ 984a_0a_1{}^2a_2b_0p^2w\lambda + 984a_0{}^2a_2{}^2b_0p^2w\lambda + 354a_1{}^3a_2b_0{}^2p^2w\lambda$$
$$+ 2056a_0a_1a_2{}^2b_0{}^2p^2w\lambda + 338a_1{}^2a_2{}^2b_0{}^3p^2w\lambda + 352a_0a_2{}^3b_0{}^3p^2w\lambda$$
$$+ 16a_1a_2{}^3b_0p^2w\lambda + 256a_1{}^3a_2b_1p^2w\lambda + 1424a_0a_1a_2{}^2b_1p^2w\lambda$$
$$+ 1144a_1{}^2a_2{}^2b_0b_1p^2w\lambda + 1136a_0a_2{}^3b_0b_1p^2w\lambda$$
$$+ 312a_1a_2{}^3b_0{}^2b_1p^2w\lambda - 32a_2{}^4b_0{}^3b_1p^2w\lambda + 216a_1a_2{}^3b_1{}^2p^2w\lambda$$
$$- 56a_2{}^4b_0b_1{}^2p^2w\lambda + 60a_0a_1{}^3p^3w\lambda + 432a_0{}^2a_1a_2p^3w\lambda$$
$$+ 38a_1{}^4b_0p^3w\lambda + 1068a_0a_1{}^2a_2b_0p^3w\lambda + 1008a_0{}^2a_2{}^2b_0p^3w\lambda$$
$$+ 270a_1{}^3a_2b_0{}^2p^3w\lambda + 1194a_0a_1a_2{}^2b_0{}^2p^3w\lambda + 135a_1{}^2a_2{}^2b_0{}^3p^3w\lambda$$
$$- 42a_0a_2{}^3b_0{}^3p^3w\lambda - 7a_1a_2{}^3b_0{}^4p^3w\lambda + 220a_1{}^3a_2b_1p^3w\lambda$$
$$+ 936a_0a_1a_2{}^2b_1p^3w\lambda + 600a_1{}^2a_2{}^2b_0b_1p^3w\lambda + 24a_0a_2{}^3b_0b_1p^3w\lambda$$
$$+ 46a_1a_2{}^3b_0{}^2b_1p^3w\lambda + 14a_2{}^4b_0{}^3b_1p^3w\lambda + 88a_1a_2{}^3b_1{}^2p^3w\lambda$$
$$+ 72a_2{}^4b_0b_1{}^2p^3w\lambda + 24a_0a_1{}^3p^4w\lambda + 216a_0{}^2a_1a_2p^4w\lambda$$
$$+ 12a_1{}^4b_0p^4w\lambda + 384a_0a_1{}^2a_2b_0p^4w\lambda + 24a_0{}^2a_2{}^2b_0p^4w\lambda$$
$$+ 78a_1{}^3a_2b_0{}^2p^4w\lambda + 74a_0a_1a_2{}^2b_0{}^2p^4w\lambda + a_1{}^2a_2{}^2b_0{}^3p^4w\lambda$$
$$+ 38a_0a_2{}^3b_0{}^3p^4w\lambda + a_1a_2{}^3b_0{}^4p^4w\lambda + 72a_1{}^3a_2b_1p^4w\lambda$$
$$+ 136a_0a_1a_2{}^2b_1p^4w\lambda + 68a_1{}^2a_2{}^2b_0b_1p^4w\lambda + 184a_0a_2{}^3b_0b_1p^4w\lambda$$

$$
\begin{aligned}
&+22a_1a_2{}^3b_0{}^2b_1p^4w\lambda-2a_2{}^4b_0{}^3b_1p^4w\lambda+16a_1a_2{}^3b_1{}^2p^4w\lambda-16a_2{}^4b_0b_1{}^2p^4w\lambda\\
&\quad+4a_1{}^4b_0\mu+48a_1{}^3a_2b_0{}^2\mu+96a_1{}^2a_2{}^2b_0{}^3\mu+32a_1a_2{}^3b_0{}^4\mu\\
&\quad+32a_1{}^3a_2b_1\mu+288a_1{}^2a_2{}^2b_0b_1\mu+384a_1a_2{}^3b_0{}^2b_1\mu+64a_2{}^4b_0{}^3b_1\mu\\
&\quad+192a_1a_2{}^3b_1{}^2\mu+192a_2{}^4b_0b_1{}^2\mu+12a_0a_1{}^3p\mu+22a_1{}^4b_0p\mu\\
&\quad+300a_0a_1{}^2a_2b_0p\mu+210a_1{}^3a_2b_0{}^2p\mu+936a_0a_1a_2{}^2b_0{}^2p\mu\\
&\quad+300a_1{}^2a_2{}^2b_0{}^3p\mu+432a_0a_2{}^3b_0{}^3p\mu+56a_1a_2{}^3b_0{}^4p\mu\\
&\quad+140a_1{}^3a_2b_1p\mu+624a_0a_1a_2{}^2b_1p\mu+900a_1{}^2a_2{}^2b_0b_1p\mu\\
&\quad+1296a_0a_2{}^3b_0b_1p\mu+672a_1a_2{}^3b_0{}^2b_1p\mu+16a_2{}^4b_0{}^3b_1p\mu\\
&\quad+336a_1a_2{}^3b_1{}^2p\mu+48a_2{}^4b_0b_1p\mu+48a_0a_1{}^3p^2\mu+216a_0{}^2a_1a_2p^2\mu\\
&\quad+44a_1{}^4b_0p^2\mu+984a_0a_1{}^2a_2b_0p^2\mu+984a_0{}^2a_2{}^2b_0p^2\mu\\
&\quad+354a_1{}^3a_2b_0{}^2p^2\mu+2056a_0a_1a_2{}^2b_0{}^2p^2\mu+338a_1{}^2a_2{}^2b_0{}^3p^2\mu\\
&\quad+352a_0a_2{}^3b_0{}^3p^2\mu+16a_1a_2{}^3b_0{}^4p^2\mu+256a_1{}^3a_2b_1p^2\mu\\
&\quad+1424a_0a_1a_2{}^2b_1p^2\mu+1144a_1{}^2a_2{}^2b_0b_1p^2\mu+1136a_0a_2{}^3b_0b_1p^2\mu\\
&\quad+312a_1a_2{}^3b_0{}^2b_1p^2\mu-32a_2{}^4b_0{}^3b_1p^2\mu+216a_1a_2{}^3b_1{}^2p^2\mu\\
&\quad-56a_2{}^4b_0b_1{}^2p^2\mu+60a_0a_1{}^3p^3\mu+432a_0{}^2a_1a_2p^3\mu+38a_1{}^4b_0p^3\mu\\
&\quad+1068a_0a_1{}^2a_2b_0p^3\mu+1008a_0{}^2a_2{}^2b_0p^3\mu+270a_1{}^3a_2b_0{}^2p^3\mu\\
&\quad+1194a_0a_1a_2{}^2b_0{}^2p^3\mu+135a_1{}^2a_2{}^2b_0{}^3p^3\mu-42a_0a_2{}^3b_0{}^3p^3\mu\\
&\quad-7a_1a_2{}^3b_0{}^4p^3\mu+220a_1{}^3a_2b_1p^3\mu+936a_0a_1a_2{}^2b_1p^3\mu\\
&\quad+600a_1{}^2a_2{}^2b_0b_1p^3\mu+24a_0a_2{}^3b_0b_1p^3\mu+46a_1a_2{}^3b_0{}^2b_1p^3\mu\\
&\quad+14a_2{}^4b_0{}^3b_1p^3\mu+88a_1a_2{}^3b_1{}^2p^3\mu+72a_2{}^4b_0b_1{}^2p^3\mu+24a_0a_1{}^3p^4\mu\\
&\quad+216a_0{}^2a_1a_2p^4\mu+12a_1{}^4b_0p^4\mu+384a_0a_1{}^2a_2b_0p^4\mu\\
&\quad+24a_0{}^2a_2{}^2b_0p^4\mu+78a_1{}^3a_2b_0{}^2p^4\mu+74a_0a_1a_2{}^2b_0{}^2p^4\mu\\
&\quad+a_1{}^2a_2{}^2b_0{}^3p^4\mu+38a_0a_2{}^3b_0{}^3p^4\mu+a_1a_2{}^3b_0{}^4p^4\mu+72a_1{}^3a_2b_1p^4\mu\\
&\quad+136a_0a_1a_2{}^2b_1p^4\mu+68a_1{}^2a_2{}^2b_0b_1p^4\mu+184a_0a_2{}^3b_0b_1p^4\mu\\
&\quad+22a_1a_2{}^3b_0{}^2b_1p^4\mu-2a_2{}^4b_0{}^3b_1p^4\mu+16a_1a_2{}^3b_1{}^2p^4\mu\\
&\quad-16a_2{}^4b_0b_1{}^2p^4\mu
\end{aligned}
$$

$$
\begin{aligned}
e^{-8\phi(\xi)}:\ & a_2{}^4p^4w + a_2{}^4p^5w + a_2{}^4p^4\alpha + a_2{}^4p^5\alpha + 10a_1{}^2a_2{}^3p^4\beta + 5a_0a_2{}^4p^4\beta \\
& - 13a_1{}^2a_2{}^2p^2w\gamma - 8a_0a_2{}^3p^2w\gamma - 24a_1a_2{}^3b_0p^2w\gamma - 4a_2{}^4b_0{}^2p^2w\gamma \\
& - 8a_2{}^4b_1p^2w\gamma - 24a_1{}^2a_2{}^2p^3w\gamma - 18a_0a_2{}^3p^3w\gamma - 33a_1a_2{}^3b_0p^3w\gamma \\
& - 4a_2{}^4b_0{}^2p^3w\gamma - 8a_2{}^4b_1p^3w\gamma - 11a_1{}^2a_2{}^2p^4w\gamma - 10a_0a_2{}^3p^4w\gamma \\
& - 9a_1a_2{}^3b_0p^4w\gamma + 13a_1{}^2a_2{}^2p^2\varepsilon + 8a_0a_2{}^3p^2\varepsilon + 24a_1a_2{}^3b_0p^2\varepsilon \\
& + 4a_2{}^4b_0{}^2p^2\varepsilon + 8a_2{}^4b_1p^2\varepsilon + 24a_1{}^2a_2{}^2p^3\varepsilon + 18a_0a_2{}^3p^3\varepsilon \\
& + 33a_1a_2{}^3b_0p^3\varepsilon + 4a_2{}^4b_0{}^2p^3\varepsilon + 8a_2{}^4b_1p^3\varepsilon + 11a_1{}^2a_2{}^2p^4\varepsilon \\
& + 10a_0a_2{}^3p^4\varepsilon + 9a_1a_2{}^3b_0p^4\varepsilon + a_1{}^4w\lambda + 32a_1{}^3a_2b_0w\lambda \\
& + 144a_1{}^2a_2{}^2b_0{}^2w\lambda + 128a_1a_2{}^3b_0{}^3w\lambda + 16a_2{}^4b_0{}^4w\lambda \\
& + 96a_1{}^2a_2{}^2b_1w\lambda + 384a_1a_2{}^3b_0b_1w\lambda + 192a_2{}^4b_0{}^2b_1w\lambda \\
& + 96a_2{}^4b_1{}^2w\lambda + 7a_1{}^4pw\lambda + 84a_0a_1{}^2a_2pw\lambda + 182a_1{}^3a_2b_0pw\lambda \\
& + 696a_0a_1a_2{}^2b_0pw\lambda + 612a_1{}^2a_2{}^2b_0{}^2pw\lambda + 720a_0a_2{}^3b_0{}^2pw\lambda \\
& + 344a_1a_2{}^3b_0{}^3pw\lambda + 16a_2{}^4b_0{}^4pw\lambda + 408a_1{}^2a_2{}^2b_1pw\lambda \\
& + 480a_0a_2{}^3b_1pw\lambda + 1032a_1a_2{}^3b_0b_1pw\lambda + 192a_2{}^4b_0{}^2b_1pw\lambda \\
& + 96a_2{}^4b_1{}^2pw\lambda + 17a_1{}^4p^2w\lambda + 336a_0a_1{}^2a_2p^2w\lambda \\
& + 300a_0{}^2a_2{}^2p^2w\lambda + 376a_1{}^3a_2b_0p^2w\lambda + 1944a_0a_1a_2{}^2b_0p^2w\lambda \\
& + 919a_1{}^2a_2{}^2b_0{}^2p^2w\lambda + 920a_0a_2{}^3b_0{}^2p^2w\lambda + 268a_1a_2{}^3b_0{}^3p^2w\lambda \\
& + 656a_1{}^2a_2{}^2b_1p^2w\lambda + 640a_0a_2{}^3b_1p^2w\lambda + 924a_1a_2{}^3b_0b_1p^2w\lambda \\
& + 40a_2{}^4b_0{}^2b_1p^2w\lambda + 40a_2{}^4b_1{}^2p^2w\lambda + 17a_1{}^4p^3w\lambda \\
& + 420a_0a_1{}^2a_2p^3w\lambda + 360a_0{}^2a_2{}^2p^3w\lambda + 334a_1{}^3a_2b_0p^3w\lambda \\
& + 1500a_0a_1a_2{}^2b_0p^3w\lambda + 528a_1{}^2a_2{}^2b_0{}^2p^3w\lambda
\end{aligned}
$$

$$+270a_0{a_2}^3{b_0}^2p^3w\lambda + 61a_1{a_2}^3{b_0}^3p^3w\lambda + 432{a_1}^2{a_2}^2b_1p^3w\lambda + 240a_0{a_2}^3b_1p^3w\lambda$$
$$+ 348a_1{a_2}^3b_0b_1p^3w\lambda + 40{a_2}^4{b_0}^2b_1p^3w\lambda + 40{a_2}^4{b_1}^2p^3w\lambda$$
$$+ 6{a_1}^4p^4w\lambda + 168a_0{a_1}^2a_2p^4w\lambda + 60{a_0}^2{a_2}^2p^4w\lambda$$
$$+ 108{a_1}^3a_2b_0p^4w\lambda + 252a_0a_1{a_2}^2b_0p^4w\lambda + 77{a_1}^2{a_2}^2{b_0}^2p^4w\lambda$$
$$+ 70a_0{a_2}^3{b_0}^2p^4w\lambda + 9a_1{a_2}^3{b_0}^3p^4w\lambda + 88{a_1}^2{a_2}^2b_1p^4w\lambda$$
$$+ 80a_0{a_2}^3b_1p^4w\lambda + 72a_1{a_2}^3b_0b_1p^4w\lambda + {a_1}^4\mu + 32{a_1}^3a_2b_0\mu$$
$$+ 144{a_1}^2{a_2}^2{b_0}^2\mu + 128a_1{a_2}^3{b_0}^3\mu + 16{a_2}^4{b_0}^4\mu + 96{a_1}^2{a_2}^2b_1\mu$$
$$+ 384a_1{a_2}^3b_0b_1\mu + 192{a_2}^4{b_0}^2b_1\mu + 96{a_2}^4{b_1}^2\mu + 7{a_1}^4p\mu$$
$$+ 84a_0{a_1}^2a_2p\mu + 182{a_1}^3a_2b_0p\mu + 696a_0a_1{a_2}^2b_0p\mu$$
$$+ 612{a_1}^2{a_2}^2{b_0}^2p\mu + 720a_0{a_2}^3{b_0}^2p\mu + 344a_1{a_2}^3{b_0}^3p\mu$$
$$+ 16{a_2}^4{b_0}^4p\mu + 408{a_1}^2{a_2}^2b_1p\mu + 480a_0{a_2}^3b_1p\mu$$
$$+ 1032a_1{a_2}^3b_0b_1p\mu + 192{a_2}^4{b_0}^2b_1p\mu + 96{a_2}^4{b_1}^2p\mu + 17{a_1}^4p^2\mu$$
$$+ 336a_0{a_1}^2a_2p^2\mu + 300{a_0}^2{a_2}^2p^2\mu + 376{a_1}^3a_2b_0p^2\mu$$
$$+ 1944a_0a_1{a_2}^2b_0p^2\mu + 919{a_1}^2{a_2}^2{b_0}^2p^2\mu + 920a_0{a_2}^3{b_0}^2p^2\mu$$
$$+ 268a_1{a_2}^3{b_0}^3p^2\mu + 656{a_1}^2{a_2}^2b_1p^2\mu + 640a_0{a_2}^3b_1p^2\mu$$
$$+ 924a_1{a_2}^3b_0b_1p^2\mu + 40{a_2}^4{b_0}^2b_1p^2\mu + 40{a_2}^4{b_1}^2p^2\mu + 17{a_1}^4p^3\mu$$
$$+ 420a_0{a_1}^2a_2p^3\mu + 360{a_0}^2{a_2}^2p^3\mu + 334{a_1}^3a_2b_0p^3\mu$$
$$+ 1500a_0a_1{a_2}^2b_0p^3\mu + 528{a_1}^2{a_2}^2{b_0}^2p^3\mu + 270a_0{a_2}^3{b_0}^2p^3\mu$$
$$+ 61a_1{a_2}^3{b_0}^3p^3\mu + 432{a_1}^2{a_2}^2b_1p^3\mu + 240a_0{a_2}^3b_1p^3\mu$$
$$+ 348a_1{a_2}^3b_0b_1p^3\mu + 40{a_2}^4{b_0}^2b_1p^3\mu + 40{a_2}^4{b_1}^2p^3\mu + 6{a_1}^4p^4\mu$$
$$+ 168a_0{a_1}^2a_2p^4\mu + 60{a_0}^2{a_2}^2p^4\mu + 108{a_1}^3a_2b_0p^4\mu$$
$$+ 252a_0a_1a_2b_0p^4\mu + 77{a_1}^2{a_2}^2{b_0}^2p^4\mu + 70a_0{a_2}^3{b_0}^2p^4\mu$$
$$+ 9a_1{a_2}^3{b_0}^3p^4\mu + 88{a_1}^2{a_2}^2b_1p^4\mu + 80a_0{a_2}^3b_1p^4\mu$$
$$+ 72a_1{a_2}^3b_0b_1p^4\mu$$

$$
\begin{aligned}
e^{-9\phi(\xi)}:\ & 5a_1a_2{}^4p^4\beta - 12a_1a_2{}^3p^2w\gamma - 8a_2{}^4b_0p^2w\gamma - 20a_1a_2{}^3p^3w\gamma \\
& - 10a_2{}^4b_0p^3w\gamma - 8a_1a_2{}^3p^4w\gamma - 2a_2{}^4b_0p^4w\gamma + 12a_1a_2{}^3p^2\varepsilon \\
& + 8a_2{}^4b_0p^2\varepsilon + 20a_1a_2{}^3p^3\varepsilon + 10a_2{}^4b_0p^3\varepsilon + 8a_1a_2{}^3p^4\varepsilon + 2a_2{}^4b_0p^4\varepsilon \\
& + 8a_1{}^3a_2w\lambda + 96a_1{}^2a_2{}^2b_0w\lambda + 192a_1a_2{}^3b_0{}^2w\lambda + 64a_2{}^4b_0{}^3w\lambda \\
& + 128a_1a_2{}^3b_1w\lambda + 192a_2{}^4b_0b_1w\lambda + 56a_1{}^3a_2pw\lambda \\
& + 192a_0a_1a_2{}^2pw\lambda + 516a_1{}^2a_2{}^2b_0pw\lambda + 528a_0a_2{}^3b_0pw\lambda \\
& + 696a_1a_2{}^3b_0{}^2pw\lambda + 112a_2{}^4b_0{}^3pw\lambda + 464a_1a_2{}^3b_1pw\lambda \\
& + 336a_2{}^4b_0b_1pw\lambda + 136a_1{}^3a_2p^2w\lambda + 648a_0a_1a_2{}^2p^2w\lambda \\
& + 948a_1{}^2a_2{}^2b_0p^2w\lambda + 912a_0a_2{}^3b_0p^2w\lambda + 792a_1a_2{}^3b_0{}^2p^2w\lambda \\
& + 64a_2{}^4b_0{}^3p^2w\lambda + 568a_1a_2{}^3b_1p^2w\lambda \\
+232a_2{}^4b_0b_1p^2w\lambda & + 136a_1{}^3a_2p^3w\lambda + 600a_0a_1a_2{}^2p^3w\lambda + 672a_1{}^2a_2{}^2b_0p^3w\lambda \\
& + 480a_0a_2{}^3b_0p^3w\lambda + 344a_1a_2{}^3b_0{}^2p^3w\lambda + 18a_2{}^4b_0{}^3p^3w\lambda \\
& + 296a_1a_2{}^3b_1p^3w\lambda + 104a_2{}^4b_0b_1p^3w\lambda + 48a_1{}^3a_2p^4w\lambda \\
& + 144a_0a_1a_2{}^2p^4w\lambda + 144a_1{}^2a_2{}^2b_0p^4w\lambda + 96a_0a_2{}^3b_0p^4w\lambda \\
& + 56a_1a_2{}^3b_0{}^2p^4w\lambda + 2a_2{}^4b_0{}^3p^4w\lambda + 64a_1a_2{}^3b_1p^4w\lambda \\
& + 16a_2{}^4b_0b_1p^4w\lambda + 8a_1{}^3a_2\mu + 96a_1{}^2a_2{}^2b_0\mu + 192a_1a_2{}^3b_0{}^2\mu \\
& + 64a_2{}^4b_0{}^3\mu + 128a_1a_2{}^3b_1\mu + 192a_2{}^4b_0b_1\mu + 56a_1{}^3a_2p\mu \\
& + 192a_0a_1a_2{}^2p\mu + 516a_1{}^2a_2{}^2b_0p\mu + 528a_0a_2{}^3b_0p\mu \\
& + 696a_1a_2{}^3b_0{}^2p\mu + 112a_2{}^4b_0{}^3p\mu + 464a_1a_2{}^3b_1p\mu + 336a_2{}^4b_0b_1p\mu \\
& + 136a_1{}^3a_2p^2\mu + 648a_0a_1a_2{}^2p^2\mu + 948a_1{}^2a_2{}^2b_0p^2\mu \\
& + 912a_0a_2{}^3b_0p^2\mu + 792a_1a_2{}^3b_0{}^2p^2\mu + 64a_2{}^4b_0{}^3p^2\mu \\
& + 568a_1a_2{}^3b_1p^2\mu + 232a_2{}^4b_0b_1p^2\mu + 136a_1{}^3a_2p^3\mu \\
& + 600a_0a_1a_2{}^2p^3\mu + 672a_1{}^2a_2{}^2b_0p^3\mu + 480a_0a_2{}^3b_0p^3\mu \\
& + 344a_1a_2{}^3b_0{}^2p^3\mu + 18a_2{}^4b_0{}^3p^3\mu + 296a_1a_2{}^3b_1p^3\mu \\
& + 104a_2{}^4b_0b_1p^3\mu + 48a_1{}^3a_2p^4\mu + 144a_0a_1a_2{}^2p^4\mu \\
& + 144a_1{}^2a_2{}^2b_0p^4\mu + 96a_0a_2{}^3b_0p^4\mu + 56a_1a_2{}^3b_0{}^2p^4\mu + 2a_2{}^4b_0{}^3p^4\mu \\
& + 64a_1a_2{}^3b_1p^4\mu + 16a_2{}^4b_0b_1p^4
\end{aligned}
$$

$$
\begin{aligned}
e^{-10\phi(\xi)}:\ & a_2{}^5p^4\beta - 4a_2{}^4p^2w\gamma - 6a_2{}^4p^3w\gamma - 2a_2{}^4p^4w\gamma + 4a_2{}^4p^2\varepsilon + 6a_2{}^4p^3\varepsilon \\
& + 2a_2{}^4p^4\varepsilon + 24a_1{}^2a_2{}^2w\lambda + 128a_1a_2{}^3b_0w\lambda + 96a_2{}^4b_0{}^2w\lambda \\
& + 64a_2{}^4b_1w\lambda + 156a_1{}^2a_2{}^2pw\lambda + 144a_0a_2{}^3pw\lambda + 584a_1a_2{}^3b_0pw\lambda \\
& + 240a_2{}^4b_0{}^2pw\lambda + 160a_2{}^4b_1pw\lambda + 336a_1{}^2a_2{}^2p^2w\lambda \\
& + 312a_0a_2{}^3p^2w\lambda + 844a_1a_2{}^3b_0p^2w\lambda + 220a_2{}^4b_0{}^2p^2w\lambda \\
& + 160a_2{}^4b_1p^2w\lambda + 276a_1{}^2a_2{}^2p^3w\lambda + 216a_0a_2{}^3p^3w\lambda \\
& + 484a_1a_2{}^3b_0p^3w\lambda + 90a_2{}^4b_0{}^2p^3w\lambda + 80a_2{}^4b_1p^3w\lambda \\
& + 72a_1{}^2a_2{}^2p^4w\lambda + 48a_0a_2{}^3p^4w\lambda + 96a_1a_2{}^3b_0p^4w\lambda \\
& + 14a_2{}^4b_0{}^2p^4w\lambda + 16a_2{}^4b_1p^4w\lambda + 24a_1{}^2a_2{}^2\mu + 128a_1a_2{}^3b_0\mu \\
& + 96a_2{}^4b_0{}^2\mu + 64a_2{}^4b_1\mu + 156a_1{}^2a_2{}^2p\mu + 144a_0a_2{}^3p\mu \\
& + 584a_1a_2{}^3b_0p\mu + 240a_2{}^4b_0{}^2p\mu + 160a_2{}^4b_1p\mu + 336a_1{}^2a_2{}^2p^2\mu \\
& + 312a_0a_2{}^3p^2\mu + 844a_1a_2{}^3b_0p^2\mu + 220a_2{}^4b_0{}^2p^2\mu + 160a_2{}^4b_1p^2\mu \\
& + 276a_1{}^2a_2{}^2p^3\mu + 216a_0a_2{}^3p^3\mu + 484a_1a_2{}^3b_0p^3\mu + 90a_2{}^4b_0{}^2p^3\mu \\
& + 80a_2{}^4b_1p^3\mu + 72a_1{}^2a_2{}^2p^4\mu + 48a_0a_2{}^3p^4\mu + 96a_1a_2{}^3b_0p^4\mu \\
& + 14a_2{}^4b_0{}^2p^4\mu + 16a_2{}^4b_1p^4\mu
\end{aligned}
$$

$$
\begin{aligned}
e^{-11\phi(\xi)}:\ & 32a_1a_2{}^3w\lambda + 64a_2{}^4b_0w\lambda + 176a_1a_2{}^3pw\lambda + 208a_2{}^4b_0pw\lambda \\
& + 304a_1a_2{}^3p^2w\lambda + 248a_2{}^4b_0p^2w\lambda + 208a_1a_2{}^3p^3w\lambda \\
& + 128a_2{}^4b_0p^3w\lambda + 48a_1a_2{}^3p^4w\lambda \\
& + 24a_2{}^4b_0p^4w\lambda + 32a_1a_2{}^3\mu + 64a_2{}^4b_0\mu + 176a_1a_2{}^3p\mu + 208a_2{}^4b_0p\mu \\
& + 304a_1a_2{}^3p^2\mu + 248a_2{}^4b_0p^2\mu + 208a_1a_2{}^3p^3\mu + 128a_2{}^4\mathrm{b}_0p^3\mu \\
& + 48a_1a_2{}^3p^4\mu + 24a_2{}^4b_0p^4\mu
\end{aligned}
$$

$$
\begin{aligned}
e^{-12\phi(\xi)}:\ & 16a_2{}^4w\lambda + 64a_2{}^4pw\lambda + 92a_2{}^4p^2w\lambda + 56a_2{}^4p^3w\lambda + 12a_2{}^4p^4w\lambda \\
& + 16a_2{}^4\mu + 64a_2{}^4p\mu + 92\mathrm{a}2^4p^2\mu + 56a_2{}^4p^3\mu + 12a_2{}^4p^4\mu
\end{aligned}
$$

olarak bulunur. Bu katsayıların oluşturduğu denklem sisteminin çözümlenmesiyle; çözüm kümesinden elde edilen parametrelerin değerleri

$a_0 = \dfrac{a_1b_1}{b_0},$

$a_2 = \dfrac{a_1}{b_0},$

$\alpha = \dfrac{a_1b_0{}^2\beta - 4b_0w - 6b_0pw - 2b_0p^2w - 4a_1b_1\beta}{2b_0(p^2 + 3p + 2)},$

$\mu = -w\lambda,$

$$\gamma = \frac{a_1 p^2 \beta + 4b_0\varepsilon + 6b_0 p\varepsilon + 2b_0 p^2 \varepsilon}{2b_0(p^2+3p+2)w}$$

şeklinde elde edilir. Çözüm kümesinden elde edilen parametrelerin değerlerinin, (3.5)-(3.9) analitik çözümlerinin (4.21) ile verilen denklemde yerlerine yazılmasıyla, $u(x,t)$ analitik çözümleri

$$u_1(x,t) = \left(\frac{a_1 b_1}{b_0} - \frac{4a_1{b_1}^2}{b_0\left(b_0 + \sqrt{\Delta}\tanh\left(\frac{\sqrt{\Delta}\xi}{2}\right)\right)^2} - \frac{2a_1 b_1}{b_0 + \sqrt{\Delta}\tanh\left(\frac{\sqrt{\Delta}\xi}{2}\right)}\right)^{\frac{1}{p}}$$

$$u_2(x,t) = \left(\frac{a_1 b_1}{b_0} - \frac{4a_1{b_1}^2}{b_0\left(b_0 - \sqrt{-\Delta}\tan\left(\frac{\sqrt{-\Delta}\xi}{2}\right)\right)^2} - \frac{2a_1 b_1}{b_0 - \sqrt{-\Delta}\tan\left(\frac{\sqrt{-\Delta}\xi}{2}\right)}\right)^{\frac{1}{p}}$$

$$u_3(x,t) = \left(\frac{a_1 b_0}{(-1+e^{b_0\xi})^2} + \frac{a_1 b_0}{-1+e^{b_0\xi}}\right)^{\frac{1}{p}}, b_1 = 0;$$

$$u_4(x,t) = \left(\frac{a_1 b_0}{4} + \frac{a_1{b_0}^3\xi^2}{4(2+b_0\xi)^2} - \frac{a_1{b_0}^2\xi}{2(2+b_0\xi)}\right)^{\frac{1}{p}}, b_1 = \frac{b_0^2}{4};$$

olarak bulunur. Burada

$$\Delta = {b_0}^2 - 4b_1$$

ve

$$\xi = x + w\frac{t^k}{k}$$

şeklindedir.

5. SONUÇ ve ÖNERİLER

Bu tezde, zaman değişkenine göre conformable anlamında kesirli mertebeden türev içeren Boussinesq-Double Sinh-Gordon, yeni ikili Mkdv ve genelleştirilmiş Rosenau-Kawahara-RLW denklemlerinin analitik çözümleri $e^{-\phi(\xi)}$ yöntemi ile elde edildi.

Tezde ele alınan zaman değişkenine göre conformable anlamında kesirli mertebeden türev içeren kısmi türevli denklemlerin $e^{-\phi(\xi)}$ yöntemi ile analitik çözümlerini elde etmek için öncelikle denklemlere dalga dönüşümü uygulanarak denklemler adi türevli denklemlere dönüştürüldü. Daha sonra elde edilen her bir adi türevli diferansiyel denklem için n tamsayısının belirlenmesiyle oluşacak olan (3.3) analitik çözümünün ve gerekli türevlerinin her bir denklemde yerlerine yazılmasıyla $e^{-\phi(\xi)}$ ifadesinin kuvvetlerini içeren cebirsel denklem elde edildi. Bulunan bu cebirsel denklemdeki $e^{-\phi(\xi)}$ ifadesinin kuvvetlerinin katsayılarının sıfıra eşitlenmesiyle bazı parametrelerin değerleri Mathematica programı yardımıyla hesaplandı. Böylece hesaplanan parametre değerlerinin ve (3.5)-(3.9) çözümlerinin (3.3) analitik çözümünde kullanılmasıyla her bir denklemin analitik çözümleri elde edildi.

Sonuç olarak, $e^{-\phi(\xi)}$ yöntemi uygulamalı matematikte sıkça kullanılan zaman değişkenine göre conformable anlamında kesirli mertebeden türev içeren kısmi türevli diferansiyel denklemlerin analitik çözümlerinin bulunmasında etkili bir yöntemdir.

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