

Pensieve header: Solving the WKO equations using free-Lie μ -calculus technology; continues pensieve://2013-05/.

Solving the Equations

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SetDirectory["C:\\drorbn\\AcademicPensieve\\2013-10"];
<< "../2013-05/FreeLie.m"
$SeriesShowDegree = 3; $SeriesCompareDegree = 5;
<< "../2013-05/muCalculus.m"

 $\mu$ Coefficients[expr_] := Flatten[Last[Reap[Collect[expr, _LW | _CW, Sow[#] &]]]];
 $\mu$ Coefficients[l_List] :=  $\mu$ Coefficients /@ l;

 $\alpha$  = MakeLieSeries[{"1", "2"},  $\alpha$ s];
 $\beta$  = MakeLieSeries[{"1", "2"},  $\beta$ s];
 $\gamma$  = MakeCWSeries[{"1", "2"},  $\gamma$ s];
V = M[{1  $\rightarrow$   $\alpha$ , 2  $\rightarrow$   $\beta$ },  $\gamma$ ];
 $\kappa$ s[d_, 1] := If[OddQ[d], 0,  $\kappa$ s[d]];
 $\kappa$  = MakeCWSeries[{"1"},  $\kappa$ s];
Unprotect[C]; C = M[{1  $\rightarrow$  MakeLieSeries[0]},  $\kappa$ ];

HardR4[d_, V_] :=
Module[{lhs = R+[2, 3] ** R+[1, 3] ** V, rhs = V ** (R+[1, 3] // d $\Delta$ [1, 1, 2])},
{lhs[1]@d - rhs[1]@d, lhs[2]@d - rhs[2]@d,
lhs[3]@d - rhs[3]@d, lhs[W]@d - rhs[W]@d}
];
TwistEq[d_, V_] :=
Module[{lhs = V **  $\theta$ [1, 2], rhs = R+[1, 2] ** (V // d $\sigma$ [{1, 2}  $\rightarrow$  {2, 1}])},
{lhs[1]@d - rhs[1]@d, lhs[2]@d - rhs[2]@d, lhs[W]@d - rhs[W]@d}
];
UnitarityEq[d_, V_] :=
Module[{lhs = V ** (V // dA[1] // dA[2]), rhs = de[1]  $\cup$  de[2]},
{lhs[1]@d - rhs[1]@d, lhs[2]@d - rhs[2]@d, lhs[W]@d - rhs[W]@d}
];
CapEq[d_, V_, C_] := Module[
{lhs = V ** (C // d $\Delta$ [1, 1, 2]) // dc[1] // dc[2], rhs = C  $\cup$  (C // d $\sigma$ [1, 2])},
{lhs[W]@d - rhs[W]@d}
];
VerticalFlipEq[d_, V_] :=
Module[{lhs = V ** (V // dS[1] // dS[2]), rhs = R+[1, 2]},
{lhs[1]@d - rhs[1]@d, lhs[2]@d - rhs[2]@d, lhs[W]@d - rhs[W]@d}
];

```

{V, C}

$$\left\{ \begin{aligned} &M \left[\left\{ 1 \rightarrow LS \left[\overline{1} \alpha_S [1, 1] + \overline{2} \alpha_S [1, 2], \overline{12} \alpha_S [2, 1], \overline{112} \alpha_S [3, 1] + \overline{122} \alpha_S [3, 2] \right\}, \right. \\ &\quad \left. 2 \rightarrow LS \left[\overline{1} \beta_S [1, 1] + \overline{2} \beta_S [1, 2], \overline{12} \beta_S [2, 1], \overline{112} \beta_S [3, 1] + \overline{122} \beta_S [3, 2] \right\} \right], \\ &CWS \left[\overline{1} \gamma_S [1, 1] + \overline{2} \gamma_S [1, 2], \overline{11} \gamma_S [2, 1] + \overline{12} \gamma_S [2, 2] + \overline{22} \gamma_S [2, 3], \right. \\ &\quad \left. \overline{111} \gamma_S [3, 1] + \overline{112} \gamma_S [3, 2] + \overline{122} \gamma_S [3, 3] + \overline{222} \gamma_S [3, 4] \right], \\ &M \left[\left\{ 1 \rightarrow LS [0, 0, 0] \right\}, CWS [0, \overline{11} \kappa_S [2], 0] \right] \end{aligned} \right\}$$

HardR4[2, V]

$$\left\{ 0, 0, -\frac{\langle 12 \rangle}{2} - \langle 12 \rangle \alpha_S [1, 2] + \langle 12 \rangle \beta_S [1, 1], 0 \right\}$$

HardR4[2, V] // μCoefficients

$$\left\{ \{0\}, \{0\}, \left\{ -\frac{1}{2} - \alpha_S [1, 2] + \beta_S [1, 1] \right\}, \{0\} \right\}$$

TwistEq[1, V] // μCoefficients

$$\left\{ \left\{ \frac{1}{2} + \alpha_S [1, 2] - \beta_S [1, 1], \alpha_S [1, 1] - \beta_S [1, 2] \right\}, \right. \\ \left. \left\{ -\frac{1}{2} - \alpha_S [1, 2] + \beta_S [1, 1], -\alpha_S [1, 1] + \beta_S [1, 2] \right\}, \right. \\ \left. \left\{ \gamma_S [1, 1] - \gamma_S [1, 2], -\gamma_S [1, 1] + \gamma_S [1, 2] \right\} \right\}$$

CapEq[1, V, C] // μCoefficients

$$\left\{ \{-\alpha_S [1, 1] + \gamma_S [1, 1], -\beta_S [1, 2] + \gamma_S [1, 2]\} \right\}$$

VerticalFlipEq[1, V] // μCoefficients

$$\left\{ \{2 \alpha_S [1, 1], 2 \alpha_S [1, 2]\}, \{-1 + 2 \beta_S [1, 1], 2 \beta_S [1, 2]\}, \{\alpha_S [1, 1], \beta_S [1, 2]\} \right\}$$

UnitarityEq[1, V] // μCoefficients

$$\left\{ \{0\}, \{0\}, \{-\alpha_S [1, 1] + 2 \gamma_S [1, 1], -\beta_S [1, 2] + 2 \gamma_S [1, 2]\} \right\}$$

**Solve[(# == 0) & /@ Union[μCoefficients[{
HardR4[2, V], TwistEq[1, V], CapEq[1, V, C], UnitarityEq[1, V]
}]]]**

$$\left\{ \left\{ \alpha_S [1, 2] \rightarrow -\frac{1}{2} + \beta_S [1, 1], \alpha_S [1, 1] \rightarrow 0, \beta_S [1, 2] \rightarrow 0, \gamma_S [1, 1] \rightarrow 0, \gamma_S [1, 2] \rightarrow 0 \right\} \right\}$$

**sol1 = Solve[(# == 0) & /@ Union[μCoefficients[{
HardR4[2, V], TwistEq[1, V], CapEq[1, V, C], VerticalFlipEq[1, V]
}]]]**

$$\left\{ \left\{ \alpha_S [1, 1] \rightarrow 0, \alpha_S [1, 2] \rightarrow 0, \beta_S [1, 1] \rightarrow \frac{1}{2}, \beta_S [1, 2] \rightarrow 0, \gamma_S [1, 1] \rightarrow 0, \gamma_S [1, 2] \rightarrow 0 \right\} \right\}$$

sol1 /. Rule -> Set; {V, C}

$$\left\{ \begin{aligned} &M \left[\left\{ 1 \rightarrow \text{LS} \left[0, \overline{12} \alpha_s[2, 1], \overline{112} \alpha_s[3, 1] + \overline{122} \alpha_s[3, 2] \right], \right. \right. \\ &\quad \left. \left. 2 \rightarrow \text{LS} \left[\frac{1}{2}, \overline{12} \beta_s[2, 1], \overline{112} \beta_s[3, 1] + \overline{122} \beta_s[3, 2] \right] \right\}, \right. \\ &\quad \text{CWS} \left[0, \overline{11} \gamma_s[2, 1] + \overline{12} \gamma_s[2, 2] + \overline{22} \gamma_s[2, 3], \right. \\ &\quad \left. \overline{111} \gamma_s[3, 1] + \overline{112} \gamma_s[3, 2] + \overline{122} \gamma_s[3, 3] + \overline{222} \gamma_s[3, 4] \right], \\ &\quad \left. M \left[\left\{ 1 \rightarrow \text{LS} [0, 0, 0] \right\}, \text{CWS} \left[0, \overline{11} \kappa_s[2], 0 \right] \right] \right\} \end{aligned} \right.$$

UnitarityEq[2, V]

$$\{0, 0, \text{CW}[12] \alpha_s[2, 1] - \text{CW}[12] \beta_s[2, 1] + 2 \text{CW}[11] \gamma_s[2, 1] + 2 \text{CW}[12] \gamma_s[2, 2] + 2 \text{CW}[22] \gamma_s[2, 3]\}$$

HardR4[3, V] // μCoefficients

$$\left\{ \{0\}, \{0\}, \left\{ -\frac{1}{24} - \alpha_s[2, 1], \frac{1}{12} + \beta_s[2, 1] \right\}, \{0\} \right\}$$

TwistEq[2, V] // μCoefficients

$$\left\{ \left\{ \frac{1}{8} + \alpha_s[2, 1] + \beta_s[2, 1] \right\}, \left\{ \frac{1}{8} + \alpha_s[2, 1] + \beta_s[2, 1] \right\}, \right. \\ \left. \left\{ \gamma_s[2, 1] - \gamma_s[2, 3], -\gamma_s[2, 1] + \gamma_s[2, 3] \right\} \right\}$$

CapEq[2, V, C] // μCoefficients

$$\left\{ \left\{ \alpha_s[2, 1] - \beta_s[2, 1] + \gamma_s[2, 2] + 2 \kappa_s[2], \gamma_s[2, 1], \gamma_s[2, 3] \right\} \right\}$$

**sol2 = Solve[(# == 0) & /@ Union[μCoefficients[{
HardR4[3, V], TwistEq[2, V], UnitarityEq[2, V], CapEq[2, V, C]
}]]]**

$$\left\{ \left\{ \alpha_s[2, 1] \rightarrow -\frac{1}{24}, \beta_s[2, 1] \rightarrow -\frac{1}{12}, \right. \right. \\ \left. \left. \gamma_s[2, 1] \rightarrow 0, \gamma_s[2, 2] \rightarrow -\frac{1}{48}, \gamma_s[2, 3] \rightarrow 0, \kappa_s[2] \rightarrow -\frac{1}{96} \right\} \right\}$$

sol2 /. Rule -> Set; {V, C}

$$\left\{ \begin{aligned} &M \left[\left\{ 1 \rightarrow \text{LS} \left[0, -\frac{\overline{12}}{24}, \overline{112} \alpha_s[3, 1] + \overline{122} \alpha_s[3, 2] \right], \right. \right. \\ &\quad \left. \left. 2 \rightarrow \text{LS} \left[\frac{1}{2}, -\frac{\overline{12}}{12}, \overline{112} \beta_s[3, 1] + \overline{122} \beta_s[3, 2] \right] \right\}, \right. \\ &\quad \text{CWS} \left[0, -\frac{\overline{12}}{48}, \overline{111} \gamma_s[3, 1] + \overline{112} \gamma_s[3, 2] + \overline{122} \gamma_s[3, 3] + \overline{222} \gamma_s[3, 4] \right], \\ &\quad \left. M \left[\left\{ 1 \rightarrow \text{LS} [0, 0, 0] \right\}, \text{CWS} \left[0, -\frac{\overline{11}}{96}, 0 \right] \right] \right\} \end{aligned} \right.$$

UnitarityEq[3, V] // μ Coefficients

$$\{\{0\}, \{0\}, \{\alpha_s[3, 1] - \beta_s[3, 1] + 2 \gamma_s[3, 2], -\alpha_s[3, 2] + \beta_s[3, 2] + 2 \gamma_s[3, 3], 2 \gamma_s[3, 1], 2 \gamma_s[3, 4]\}\}$$

HardR4[4, V] // μ Coefficients

$$\{\{0\}, \{0\}, \{-\alpha_s[3, 1], -\alpha_s[3, 2] + \beta_s[3, 1], \beta_s[3, 2]\}, \{0\}\}$$

TwistEq[3, V] // μ Coefficients

$$\{\{\alpha_s[3, 1] - \beta_s[3, 2], \alpha_s[3, 2] - \beta_s[3, 1]\}, \{-\alpha_s[3, 1] + \beta_s[3, 2], -\alpha_s[3, 2] + \beta_s[3, 1]\}, \{\gamma_s[3, 1] - \gamma_s[3, 4], -\gamma_s[3, 1] + \gamma_s[3, 4], \gamma_s[3, 2] - \gamma_s[3, 3], -\gamma_s[3, 2] + \gamma_s[3, 3]\}\}$$

CapEq[3, V, C] // μ Coefficients

$$\{\{\alpha_s[3, 1] - \beta_s[3, 1] + \gamma_s[3, 2], -\alpha_s[3, 2] + \beta_s[3, 2] + \gamma_s[3, 3], \gamma_s[3, 1], \gamma_s[3, 4]\}\}$$

**sol3 = Solve[(# == 0) & /@ Union[μ Coefficients[{
 HardR4[4, V], TwistEq[3, V], UnitarityEq[3, V], CapEq[3, V, C]
 }]]]**

$$\{\{\alpha_s[3, 1] \rightarrow 0, \alpha_s[3, 2] \rightarrow 0, \beta_s[3, 1] \rightarrow 0, \beta_s[3, 2] \rightarrow 0, \gamma_s[3, 1] \rightarrow 0, \gamma_s[3, 2] \rightarrow 0, \gamma_s[3, 3] \rightarrow 0, \gamma_s[3, 4] \rightarrow 0\}\}$$

sol3 /. Rule -> Set; {V, C}

$$\left\{ \mathbb{M} \left[\left\{ 1 \rightarrow \text{LS} \left[0, -\frac{12}{24}, 0 \right], 2 \rightarrow \text{LS} \left[\frac{1}{2}, -\frac{12}{12}, 0 \right] \right\}, \text{CWS} \left[0, -\frac{12}{48}, 0 \right] \right], \mathbb{M} \left[\left\{ 1 \rightarrow \text{LS} [0, 0, 0], \text{CWS} \left[0, -\frac{11}{96}, 0 \right] \right\} \right] \right\}$$

UnitarityEq[4, V] // μ Coefficients

$$\left\{ \{0\}, \{0\}, \left\{ -\frac{1}{576} + \alpha_s[4, 1] - \beta_s[4, 1] + 2 \gamma_s[4, 2], -\frac{1}{1152} + \alpha_s[4, 2] - \beta_s[4, 2] + 2 \gamma_s[4, 3], -2 \alpha_s[4, 2] + 2 \beta_s[4, 2] + 2 \gamma_s[4, 4], \alpha_s[4, 3] - \beta_s[4, 3] + 2 \gamma_s[4, 5], 2 \gamma_s[4, 1], 2 \gamma_s[4, 6] \right\} \right\}$$

**sol4 = Solve[(# == 0) & /@ Union[μ Coefficients[{
 HardR4[5, V], TwistEq[4, V], UnitarityEq[4, V], CapEq[4, V, C]
 }]]]**

$$\left\{ \left\{ \alpha_s[4, 1] \rightarrow \frac{7}{5760}, \beta_s[4, 1] \rightarrow \frac{1}{5760}, \alpha_s[4, 2] \rightarrow -\frac{7}{5760}, \alpha_s[4, 3] \rightarrow \frac{1}{1440}, \beta_s[4, 2] \rightarrow -\frac{1}{720}, \beta_s[4, 3] \rightarrow \frac{1}{720}, \gamma_s[4, 1] \rightarrow 0, \gamma_s[4, 2] \rightarrow \frac{1}{2880}, \gamma_s[4, 3] \rightarrow \frac{1}{2880}, \gamma_s[4, 4] \rightarrow \frac{1}{5760}, \gamma_s[4, 5] \rightarrow \frac{1}{2880}, \gamma_s[4, 6] \rightarrow 0, \kappa_s[4] \rightarrow \frac{1}{11520} \right\} \right\}$$

sol4 /. Rule -> Set; \$SeriesShowDegree = 4; {V, C}

$$\left\{ M \left[\left\{ 1 \rightarrow LS \left[0, -\frac{\overline{12}}{24}, 0, \frac{\overline{71112}}{5760} - \frac{\overline{71122}}{5760} + \frac{\overline{1222}}{1440} \right], \right. \right. \\ \left. \left. 2 \rightarrow LS \left[\frac{\overline{1}}{2}, -\frac{\overline{12}}{12}, 0, \frac{\overline{1112}}{5760} - \frac{1}{720} \overline{1122} + \frac{1}{720} \overline{1222} \right] \right\}, \right. \\ \left. CWS \left[0, -\frac{\overline{12}}{48}, 0, \frac{\overline{1112}}{2880} + \frac{\overline{1122}}{2880} + \frac{\overline{1212}}{5760} + \frac{\overline{1222}}{2880} \right] \right\}, \\ M \left[\left\{ 1 \rightarrow LS [0, 0, 0, 0] \right\}, CWS \left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11520} \right] \right\}$$

VerticalFlipEq[#, V] & /@ {2, 3, 4}

$$\{ \{0, 0, 0\}, \{0, 0, 0\}, \{0, 0, 0\} \}$$

sol5 = Solve[(# == 0) & /@ Union[μCoefficients[{ HardR4[6, V], TwistEq[5, V], UnitarityEq[5, V], CapEq[5, V, C] }]]]

$$\left\{ \left\{ \alpha_s [5, 1] \rightarrow 0, \alpha_s [5, 3] \rightarrow 0, \beta_s [5, 1] \rightarrow -\frac{1}{7680}, \alpha_s [5, 6] \rightarrow 0, \alpha_s [5, 2] \rightarrow 0, \right. \right. \\ \alpha_s [5, 4] \rightarrow 0, \beta_s [5, 2] \rightarrow \frac{1}{3840}, \alpha_s [5, 5] \rightarrow 0, \beta_s [5, 3] \rightarrow -\frac{1}{6912}, \beta_s [5, 4] \rightarrow 0, \\ \beta_s [5, 5] \rightarrow 0, \beta_s [5, 6] \rightarrow 0, \gamma_s [5, 1] \rightarrow 0, \gamma_s [5, 2] \rightarrow 0, \gamma_s [5, 3] \rightarrow 0, \\ \left. \left. \gamma_s [5, 4] \rightarrow 0, \gamma_s [5, 5] \rightarrow 0, \gamma_s [5, 6] \rightarrow 0, \gamma_s [5, 7] \rightarrow 0, \gamma_s [5, 8] \rightarrow 0 \right\} \right\}$$

sol5 /. Rule -> Set; \$SeriesShowDegree = 5; {V, C}

$$\left\{ M \left[\left\{ 1 \rightarrow LS \left[0, -\frac{\overline{12}}{24}, 0, \frac{\overline{71112}}{5760} - \frac{\overline{71122}}{5760} + \frac{\overline{1222}}{1440} \right], 0 \right\}, 2 \rightarrow \right. \\ \left. LS \left[\frac{\overline{1}}{2}, -\frac{\overline{12}}{12}, 0, \frac{\overline{1112}}{5760} - \frac{1}{720} \overline{1122} + \frac{1}{720} \overline{1222}, -\frac{\overline{11112}}{7680} + \frac{\overline{11122}}{3840} - \frac{\overline{11212}}{6912} \right] \right\}, \\ \left. CWS \left[0, -\frac{\overline{12}}{48}, 0, \frac{\overline{1112}}{2880} + \frac{\overline{1122}}{2880} + \frac{\overline{1212}}{5760} + \frac{\overline{1222}}{2880}, 0 \right] \right\}, \\ M \left[\left\{ 1 \rightarrow LS [0, 0, 0, 0, 0] \right\}, CWS \left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11520}, 0 \right] \right\}$$

VerticalFlipEq[5, V]

$$\{0, 0, 0\}$$

```
sol6 = Solve[ (# == 0) & /@ Union[μCoefficients[ {
  HardR4[7, V], TwistEq[6, V], UnitarityEq[6, V], CapEq[6, V, C]
}]]]
```

$$\left\{ \left\{ \begin{aligned} \alpha_s[6, 1] &\rightarrow -\frac{31}{967680}, \alpha_s[6, 3] \rightarrow -\frac{31}{645120}, \beta_s[6, 1] \rightarrow -\frac{1}{645120}, \\ \alpha_s[6, 9] &\rightarrow -\frac{1}{60480}, \alpha_s[6, 2] \rightarrow \frac{31}{483840}, \beta_s[6, 2] \rightarrow \frac{23}{483840}, \alpha_s[6, 7] \rightarrow \frac{13}{241920}, \\ \alpha_s[6, 4] &\rightarrow -\frac{83}{967680}, \beta_s[6, 3] \rightarrow -\frac{41}{580608}, \alpha_s[6, 8] \rightarrow \frac{101}{1451520}, \\ \alpha_s[6, 5] &\rightarrow -\frac{31}{725760}, \alpha_s[6, 6] \rightarrow \frac{527}{5806080}, \beta_s[6, 4] \rightarrow -\frac{13}{161280}, \beta_s[6, 5] \rightarrow -\frac{1}{22680}, \\ \beta_s[6, 6] &\rightarrow \frac{71}{483840}, \beta_s[6, 7] \rightarrow \frac{1}{15120}, \beta_s[6, 8] \rightarrow \frac{1}{12096}, \beta_s[6, 9] \rightarrow -\frac{1}{30240}, \\ \gamma_s[6, 1] &\rightarrow 0, \gamma_s[6, 2] \rightarrow -\frac{1}{120960}, \gamma_s[6, 3] \rightarrow -\frac{1}{120960}, \gamma_s[6, 4] \rightarrow -\frac{1}{120960}, \\ \gamma_s[6, 5] &\rightarrow -\frac{1}{120960}, \gamma_s[6, 6] \rightarrow -\frac{1}{241920}, \gamma_s[6, 7] \rightarrow -\frac{1}{120960}, \gamma_s[6, 8] \rightarrow -\frac{1}{120960}, \\ \gamma_s[6, 9] &\rightarrow -\frac{1}{120960}, \gamma_s[6, 10] \rightarrow -\frac{1}{362880}, \gamma_s[6, 11] \rightarrow -\frac{1}{120960}, \\ \gamma_s[6, 12] &\rightarrow -\frac{1}{241920}, \gamma_s[6, 13] \rightarrow -\frac{1}{120960}, \gamma_s[6, 14] \rightarrow 0, \kappa_s[6] \rightarrow -\frac{1}{725760} \end{aligned} \right\} \right\}$$

sol6 /. Rule -> Set; \$SeriesShowDegree = 6; {V, C}

$$\left\{ M \left[\left\{ 1 \rightarrow \text{LS} \left[0, -\frac{\overline{12}}{24}, 0, \frac{\overline{71112}}{5760} - \frac{\overline{71122}}{5760} + \frac{\overline{1222}}{1440}, \right. \right. \right. \\ \left. \left. \left. 0, -\frac{\overline{3111112}}{967680} + \frac{\overline{3111122}}{483840} - \frac{\overline{83111222}}{967680} - \frac{\overline{31112122}}{725760} - \right. \right. \right. \\ \left. \left. \left. \frac{\overline{31111212}}{645120} + \frac{\overline{13112222}}{241920} + \frac{\overline{101121222}}{1451520} + \frac{\overline{527112212}}{5806080} - \frac{\overline{122222}}{60480} \right\} \right], \right. \\ \left. 2 \rightarrow \text{LS} \left[\frac{\overline{1}}{2}, -\frac{\overline{12}}{12}, 0, \frac{\overline{1112}}{5760} - \frac{1}{720} \frac{\overline{1122}}{1222} + \frac{1}{720} \frac{\overline{1222}}{1222}, -\frac{\overline{11112}}{7680} + \frac{\overline{11122}}{3840} - \frac{\overline{11212}}{6912}, \right. \right. \\ \left. \left. -\frac{\overline{11112}}{645120} + \frac{\overline{2311122}}{483840} - \frac{\overline{13111222}}{161280} - \frac{\overline{112122}}{22680} - \right. \right. \\ \left. \left. \frac{\overline{41111212}}{580608} + \frac{\overline{112222}}{15120} + \frac{\overline{121222}}{12096} + \frac{\overline{71112212}}{483840} - \frac{\overline{122222}}{30240} \right\} \right], \\ \left. \text{CWS} \left[0, -\frac{\overline{12}}{48}, 0, \frac{\overline{1112}}{2880} + \frac{\overline{1122}}{2880} + \frac{\overline{1212}}{5760} + \frac{\overline{1222}}{2880}, 0, -\frac{\overline{11112}}{120960} - \frac{\overline{111122}}{120960} - \frac{\overline{111212}}{120960} - \frac{\overline{111222}}{120960} - \right. \right. \\ \left. \left. \frac{\overline{112112}}{241920} - \frac{\overline{112122}}{120960} - \frac{\overline{112212}}{120960} - \frac{\overline{112222}}{120960} - \frac{\overline{121212}}{362880} - \frac{\overline{121222}}{120960} - \frac{\overline{122122}}{241920} - \frac{\overline{122222}}{120960} \right] \right], \\ M \left[\left\{ 1 \rightarrow \text{LS} [0, 0, 0, 0, 0, 0] \right\}, \text{CWS} \left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11520}, 0, -\frac{\overline{111111}}{725760} \right] \right] \right\}$$

VerticalFlipEq[6, V]

$$\{0, 0, 0\}$$

```
sol7 = Solve[ (# == 0) & /@ Union[μCoefficients[{
    HardR4[8, V], TwistEq[7, V], UnitarityEq[7, V], CapEq[7, V, C]
}]]]
```

$$\left\{ \left\{ \begin{aligned} \alpha_s[7, 1] \rightarrow 0, \alpha_s[7, 3] \rightarrow 0, \beta_s[7, 1] \rightarrow \frac{1}{258048}, \alpha_s[7, 18] \rightarrow 0, \alpha_s[7, 2] \rightarrow 0, \\ \alpha_s[7, 5] \rightarrow 0, \alpha_s[7, 14] \rightarrow 0, \beta_s[7, 2] \rightarrow -\frac{5}{387072}, \alpha_s[7, 4] \rightarrow 0, \alpha_s[7, 16] \rightarrow 0, \\ \beta_s[7, 3] \rightarrow \frac{5}{290304}, \alpha_s[7, 10] \rightarrow 0, \alpha_s[7, 6] \rightarrow 0, \alpha_s[7, 7] \rightarrow 0, \alpha_s[7, 8] \rightarrow 0, \\ \beta_s[7, 4] \rightarrow \frac{1}{64512}, \alpha_s[7, 17] \rightarrow 0, \beta_s[7, 5] \rightarrow -\frac{7}{1658880}, \alpha_s[7, 9] \rightarrow 0, \\ \alpha_s[7, 11] \rightarrow 0, \beta_s[7, 6] \rightarrow \frac{1}{96768}, \alpha_s[7, 13] \rightarrow 0, \beta_s[7, 7] \rightarrow -\frac{1}{60480}, \\ \alpha_s[7, 12] \rightarrow 0, \beta_s[7, 8] \rightarrow -\frac{1}{96768}, \beta_s[7, 9] \rightarrow -\frac{1}{207360}, \alpha_s[7, 15] \rightarrow 0, \\ \beta_s[7, 10] \rightarrow 0, \beta_s[7, 11] \rightarrow -\frac{17}{1451520}, \beta_s[7, 12] \rightarrow 0, \beta_s[7, 13] \rightarrow \frac{1}{207360}, \\ \beta_s[7, 14] \rightarrow 0, \beta_s[7, 15] \rightarrow 0, \beta_s[7, 16] \rightarrow 0, \beta_s[7, 17] \rightarrow 0, \beta_s[7, 18] \rightarrow 0, \\ \gamma_s[7, 1] \rightarrow 0, \gamma_s[7, 2] \rightarrow 0, \gamma_s[7, 3] \rightarrow 0, \gamma_s[7, 4] \rightarrow 0, \gamma_s[7, 5] \rightarrow 0, \\ \gamma_s[7, 6] \rightarrow 0, \gamma_s[7, 7] \rightarrow 0, \gamma_s[7, 8] \rightarrow 0, \gamma_s[7, 9] \rightarrow 0, \gamma_s[7, 10] \rightarrow 0, \\ \gamma_s[7, 11] \rightarrow 0, \gamma_s[7, 12] \rightarrow 0, \gamma_s[7, 13] \rightarrow 0, \gamma_s[7, 14] \rightarrow 0, \gamma_s[7, 15] \rightarrow 0, \\ \gamma_s[7, 16] \rightarrow 0, \gamma_s[7, 17] \rightarrow 0, \gamma_s[7, 18] \rightarrow 0, \gamma_s[7, 19] \rightarrow 0, \gamma_s[7, 20] \rightarrow 0 \end{aligned} \right\} \right\}$$

`sol7 /. Rule -> Set; $SeriesShowDegree = 7; {V, C}`

$$\left\{ M \left[\left\{ 1 \rightarrow \text{LS} \left[0, -\frac{\overline{12}}{24}, 0, \frac{\overline{71112}}{5760} - \frac{\overline{71122}}{5760} + \frac{\overline{1222}}{1440}, 0, \right. \right. \right. \\ - \frac{\overline{31111112}}{967680} + \frac{\overline{31111122}}{483840} - \frac{\overline{83111222}}{967680} - \frac{\overline{31112122}}{725760} - \frac{\overline{31111212}}{645120} + \\ \left. \left. \left. \frac{\overline{13112222}}{241920} + \frac{\overline{101121222}}{1451520} + \frac{\overline{527112212}}{5806080} - \frac{\overline{122222}}{60480}, 0 \right\}, \right. \right. \\ \left. \left. 2 \rightarrow \text{LS} \left[\frac{\overline{1}}{2}, -\frac{\overline{12}}{12}, 0, \frac{\overline{1112}}{5760} - \frac{1}{720} \frac{\overline{1122}}{1222} + \frac{1}{720} \frac{\overline{1222}}{1222}, -\frac{\overline{11112}}{7680} + \frac{\overline{11122}}{3840} - \frac{\overline{11212}}{6912}, \right. \right. \right. \\ - \frac{\overline{111112}}{645120} + \frac{\overline{23111122}}{483840} - \frac{\overline{13111222}}{161280} - \frac{\overline{112122}}{22680} - \\ \frac{\overline{41111212}}{580608} + \frac{\overline{112222}}{15120} + \frac{\overline{121222}}{12096} + \frac{\overline{71112212}}{483840} - \frac{\overline{122222}}{30240}, \\ \frac{\overline{1111112}}{258048} - \frac{\overline{51111122}}{387072} + \frac{\overline{1111222}}{64512} + \frac{\overline{1112122}}{96768} + \frac{\overline{51111212}}{290304} - \frac{\overline{1112222}}{96768} - \\ \left. \left. \left. \frac{\overline{171121222}}{1451520} - \frac{\overline{1112212}}{60480} - \frac{\overline{1121122}}{207360} - \frac{\overline{71112112}}{1658880} + \frac{\overline{1122212}}{207360} \right\} \right\}, \right. \\ \left. \text{CWS} \left[0, -\frac{\overline{12}}{48}, 0, \frac{\overline{1112}}{2880} + \frac{\overline{1122}}{2880} + \frac{\overline{1212}}{5760} + \frac{\overline{1222}}{2880}, 0, \right. \right. \\ - \frac{\overline{111112}}{120960} - \frac{\overline{111122}}{120960} - \frac{\overline{111212}}{120960} - \frac{\overline{111222}}{120960} - \frac{\overline{112112}}{241920} - \frac{\overline{112122}}{120960} - \\ \left. \left. \left. \frac{\overline{112212}}{120960} - \frac{\overline{112222}}{120960} - \frac{\overline{121212}}{362880} - \frac{\overline{121222}}{120960} - \frac{\overline{122122}}{241920} - \frac{\overline{122222}}{120960}, 0 \right\} \right\}, \right. \\ \left. M \left[\left\{ 1 \rightarrow \text{LS} [0, 0, 0, 0, 0, 0, 0, 0] \right\}, \text{CWS} \left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11520}, 0, -\frac{\overline{111111}}{725760}, 0 \right] \right\} \right\}$$

`VerticalFlipEq[7, V]`

{0, 0, 0}

`sol8 = Solve[(# == 0) & /@ Union[μCoefficients[{
HardR4[9, V], TwistEq[8, V], UnitarityEq[8, V], CapEq[8, V, C]
}]]]`

$$\left\{ \left\{ \alpha_s[8, 1] \rightarrow \frac{127}{154828800}, \beta_s[8, 1] \rightarrow \frac{1}{77414400}, \alpha_s[8, 3] \rightarrow \frac{127}{30965760}, \right. \right.$$

$$\begin{aligned}
 \alpha s[8, 30] &\rightarrow \frac{1}{2419200}, \alpha s[8, 5] \rightarrow -\frac{127}{77414400}, \alpha s[8, 2] \rightarrow -\frac{127}{51609600}, \\
 \alpha s[8, 4] &\rightarrow \frac{2399}{464486400}, \beta s[8, 2] \rightarrow -\frac{587}{464486400}, \alpha s[8, 25] \rightarrow -\frac{19}{9676800}, \\
 \alpha s[8, 10] &\rightarrow -\frac{733}{23224320} - 6\beta s[8, 27], \beta s[8, 3] \rightarrow \frac{929}{55738368} + 2\beta s[8, 27], \\
 \alpha s[8, 16] &\rightarrow -\frac{7549}{348364800} - 4\beta s[8, 27], \alpha s[8, 6] \rightarrow \frac{4589}{348364800} + 2\beta s[8, 27], \\
 \alpha s[8, 7] &\rightarrow \frac{5783}{696729600} + 4\beta s[8, 27], \alpha s[8, 28] \rightarrow -\frac{493}{29030400} - 2\beta s[8, 27], \\
 \alpha s[8, 8] &\rightarrow -\frac{2893}{464486400}, \beta s[8, 4] \rightarrow \frac{253}{66355200}, \alpha s[8, 15] \rightarrow \frac{271}{58060800}, \\
 \beta s[8, 5] &\rightarrow \frac{797}{232243200} + \beta s[8, 27], \alpha s[8, 29] \rightarrow -\frac{49}{1382400} - 5\beta s[8, 27], \\
 \alpha s[8, 9] &\rightarrow \frac{19}{9289728} + \beta s[8, 27], \alpha s[8, 12] \rightarrow \frac{3733}{232243200} + 2\beta s[8, 27], \\
 \alpha s[8, 20] &\rightarrow \frac{1661}{87091200} + \frac{3}{2}\beta s[8, 27], \beta s[8, 6] \rightarrow -\frac{3427}{348364800} - \frac{3}{2}\beta s[8, 27], \\
 \alpha s[8, 11] &\rightarrow -\frac{25399}{1393459200} - \frac{3}{2}\beta s[8, 27], \alpha s[8, 24] \rightarrow -\frac{121}{7257600} - \frac{3}{2}\beta s[8, 27], \\
 \beta s[8, 7] &\rightarrow -\frac{4697}{99532800} - \frac{9}{2}\beta s[8, 27], \alpha s[8, 13] \rightarrow -\frac{14099}{696729600} - \frac{9}{2}\beta s[8, 27], \\
 \alpha s[8, 14] &\rightarrow -\frac{16483}{1393459200} - \frac{9}{2}\beta s[8, 27], \beta s[8, 8] \rightarrow -\frac{43}{7257600}, \\
 \alpha s[8, 22] &\rightarrow -\frac{1933}{348364800} - \frac{3}{2}\beta s[8, 27], \beta s[8, 9] \rightarrow \frac{281}{92897280} + \frac{3}{2}\beta s[8, 27], \\
 \alpha s[8, 17] &\rightarrow \frac{6857}{464486400} + \frac{3}{2}\beta s[8, 27], \beta s[8, 10] \rightarrow \frac{271}{30965760}, \\
 \alpha s[8, 19] &\rightarrow \frac{9907}{348364800} + \frac{9}{2}\beta s[8, 27], \alpha s[8, 26] \rightarrow \frac{629}{12902400} + 6\beta s[8, 27], \\
 \alpha s[8, 18] &\rightarrow \frac{3239}{174182400} + \frac{9}{2}\beta s[8, 27], \alpha s[8, 21] \rightarrow \frac{449}{9676800} + 9\beta s[8, 27], \\
 \beta s[8, 11] &\rightarrow \frac{29}{24883200} + \frac{3}{2}\beta s[8, 27], \alpha s[8, 23] \rightarrow -\frac{299}{5529600} - \frac{15}{2}\beta s[8, 27], \\
 \beta s[8, 12] &\rightarrow \frac{2281}{464486400}, \beta s[8, 13] \rightarrow -\frac{1}{108864} - 3\beta s[8, 27], \\
 \beta s[8, 14] &\rightarrow \frac{1991}{174182400} - \frac{3}{2}\beta s[8, 27], \beta s[8, 15] \rightarrow \frac{73}{14515200}, \\
 \beta s[8, 16] &\rightarrow -\frac{5653}{1393459200} - \frac{3}{2}\beta s[8, 27], \alpha s[8, 27] \rightarrow -\frac{1}{30720} - \frac{9}{2}\beta s[8, 27], \\
 \beta s[8, 17] &\rightarrow \frac{47}{6451200}, \beta s[8, 18] \rightarrow \frac{41}{5443200} + 3\beta s[8, 27], \\
 \beta s[8, 19] &\rightarrow \frac{151}{14515200} + \frac{3}{2}\beta s[8, 27], \beta s[8, 20] \rightarrow -\frac{1}{1088640} - 2\beta s[8, 27],
 \end{aligned}$$

$$\begin{aligned}
 \beta_s[8, 21] &\rightarrow -\frac{391}{17\,418\,240} - \frac{3}{2}\beta_s[8, 27], \beta_s[8, 22] \rightarrow -\frac{1313}{87\,091\,200} - 3\beta_s[8, 27], \\
 \beta_s[8, 23] &\rightarrow -\frac{1}{92\,160}, \beta_s[8, 24] \rightarrow -\frac{151}{14\,515\,200}, \beta_s[8, 25] \rightarrow -\frac{1}{403\,200}, \\
 \beta_s[8, 26] &\rightarrow \frac{2459}{87\,091\,200} + 2\beta_s[8, 27], \beta_s[8, 28] \rightarrow -\frac{1}{172\,800}, \beta_s[8, 29] \rightarrow -\frac{1}{172\,800}, \\
 \beta_s[8, 30] &\rightarrow \frac{1}{1\,209\,600}, \gamma_s[8, 1] \rightarrow 0, \gamma_s[8, 2] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 3] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 4] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 5] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 6] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 7] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 8] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 9] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 10] &\rightarrow \frac{1}{9\,676\,800}, \gamma_s[8, 11] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 12] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 13] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 14] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 15] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 16] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 17] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 18] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 19] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 20] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 21] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 22] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 23] \rightarrow \frac{1}{9\,676\,800}, \gamma_s[8, 24] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 25] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 26] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 27] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 28] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 29] \rightarrow \frac{1}{19\,353\,600}, \gamma_s[8, 30] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 31] &\rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 32] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 33] \rightarrow \frac{1}{4\,838\,400}, \\
 \gamma_s[8, 34] &\rightarrow \frac{1}{9\,676\,800}, \gamma_s[8, 35] \rightarrow \frac{1}{4\,838\,400}, \gamma_s[8, 36] \rightarrow 0, \kappa_s[8] \rightarrow \frac{1}{38\,707\,200} \}}
 \end{aligned}$$

$\beta_s[8, 27] = 1$; sol8 /. Rule \rightarrow Set; \$SeriesShowDegree = 8; {V, C}

$$\begin{aligned}
 \{M[1 \rightarrow LS[0, -\frac{12}{24}, 0, \frac{71112}{5760} - \frac{71122}{5760} + \frac{1222}{1440}, \\
 0, -\frac{31111112}{967680} + \frac{31111122}{483840} - \frac{83111222}{967680} - \frac{31112122}{725760} - \\
 \frac{31111212}{645120} + \frac{13112222}{241920} + \frac{101121222}{1451520} + \frac{527112212}{5806080} - \frac{122222}{60480}, \\
 0, \frac{12711111112}{154828800} - \frac{12711111122}{51609600} + \frac{239911111222}{464486400} +
 \end{aligned}$$

$$\frac{696\ 734\ 189\ 111\ 12\ 122}{348\ 364\ 800} + \frac{127\ 111\ 112\ 12}{30\ 965\ 760} - \frac{2893\ 111\ 122\ 22}{464\ 486\ 400} -$$

$$\frac{2\ 090\ 214\ 199\ 111\ 12\ 122\ 2}{1\ 393\ 459\ 200} + \frac{2\ 786\ 924\ 183\ 111\ 122\ 12}{696\ 729\ 600} + \frac{271\ 11\ 122\ 222}{58\ 060\ 800} +$$

$$\frac{783\ 824\ 039\ 112\ 12\ 122}{174\ 182\ 400} + \frac{130\ 638\ 461\ 112\ 122\ 22}{87\ 091\ 200} + \frac{9\ 289\ 747\ 1112\ 1122}{9\ 289\ 728} -$$

$$\frac{127\ 11\ 112\ 112}{77\ 414\ 400} - \frac{3\ 135\ 297\ 299\ 11\ 122\ 122}{696\ 729\ 600} - \frac{6\ 270\ 582\ 883\ 11\ 122\ 212}{1\ 393\ 459\ 200} -$$

$$\frac{522\ 549\ 133\ 1122\ 1222}{348\ 364\ 800} - \frac{139\ 346\ 653\ 1112\ 1212}{23\ 224\ 320} - \frac{19\ 1122\ 2222}{9\ 676\ 800} +$$

$$\frac{77\ 415\ 029\ 1212\ 1222}{12\ 902\ 400} - \frac{58\ 061\ 293\ 12122\ 222}{29\ 030\ 400} + \frac{696\ 736\ 457\ 112\ 11222}{464\ 486\ 400} -$$

$$\frac{1\ 393\ 466\ 749\ 112\ 11212}{348\ 364\ 800} + \frac{464\ 490\ 133\ 11122\ 112}{232\ 243\ 200} + \frac{1\ 567\ 651\ 507\ 11212212}{348\ 364\ 800} -$$

$$\frac{41\ 472\ 299\ 11222122}{5\ 529\ 600} - \frac{10\ 886\ 521\ 11222212}{7\ 257\ 600} - \frac{6\ 912\ 049\ 12212222}{1\ 382\ 400} -$$

$$\frac{138\ 241\ 12122122}{30\ 720} + \frac{87\ 091\ 649\ 11221212}{9\ 676\ 800} + \frac{122\ 22222}{2\ 419\ 200} \Bigg],$$

$$2 \rightarrow \text{LS} \left[\frac{1}{2}, -\frac{12}{12}, 0, \frac{1112}{5760} - \frac{1}{720} \frac{1122}{1122} + \frac{1}{720} \frac{1222}{1222}, -\frac{1112}{7680} + \frac{11122}{3840} - \frac{11212}{6912} \right],$$

$$- \frac{111112}{645120} + \frac{23111122}{483840} - \frac{13111222}{161280} - \frac{112122}{22680} -$$

$$\frac{41111212}{580608} + \frac{112222}{15120} + \frac{121222}{12096} + \frac{71112212}{483840} - \frac{122222}{30240},$$

$$\frac{\overline{1111112}}{258048} - \frac{\overline{51111122}}{387072} + \frac{\overline{11112222}}{64512} + \frac{\overline{11121222}}{96768} + \frac{\overline{51111212}}{290304} - \frac{\overline{11122222}}{96768} -$$

$$\frac{\overline{1711212222}}{1451520} - \frac{\overline{11122122}}{60480} - \frac{\overline{11211222}}{207360} - \frac{\overline{71112112}}{1658880} + \frac{\overline{11222122}}{207360},$$

$$\frac{\overline{11111112}}{77414400} - \frac{\overline{5871111122}}{464486400} + \frac{\overline{25311112222}}{66355200} - \frac{\overline{522550627111121222}}{348364800} +$$

$$\frac{\overline{11147766511111212}}{55738368} - \frac{\overline{43111122222}}{7257600} + \frac{\overline{37324829111212222}}{24883200} -$$

$$\frac{\overline{44790229711112212}}{99532800} + \frac{\overline{73111222222}}{14515200} + \frac{\overline{16329641112121222}}{5443200} -$$

$$\frac{\overline{2177281112122222}}{1088640} + \frac{\overline{139346201111211222}}{92897280} + \frac{\overline{23224399711112112}}{232243200} -$$

$$\frac{\overline{326593111221222}}{108864} - \frac{\overline{261271609111222122}}{174182400} - \frac{\overline{261274913112212222}}{87091200} +$$

$$\frac{\overline{271111212122}}{30965760} - \frac{\overline{112222222}}{403200} + \frac{\overline{174184859121212222}}{87091200} - \frac{\overline{121222222}}{172800} +$$

$$\frac{\overline{47112112222}}{6451200} - \frac{\overline{2090194453112112122}}{1393459200} + \frac{\overline{228111122112}}{464486400} +$$

$$\frac{\overline{21772951112122122}}{14515200} - \frac{\overline{112221222}}{92160} - \frac{\overline{151112222122}}{14515200} -$$

$$\left. \frac{\overline{12212222}}{172800} + \frac{\overline{12122122}}{12122122} - \frac{\overline{26127751112212122}}{17418240} + \frac{\overline{122222222}}{1209600} \right\},$$

$$\text{CWS} \left[0, -\frac{\overline{12}}{48}, 0, \frac{\overline{1112}}{2880} + \frac{\overline{1122}}{2880} + \frac{\overline{1212}}{5760} + \frac{\overline{1222}}{2880}, 0, \right.$$

$$\left. -\frac{\overline{111112}}{120960} - \frac{\overline{111122}}{120960} - \frac{\overline{111212}}{120960} - \frac{\overline{111222}}{120960} - \frac{\overline{112112}}{241920} - \frac{\overline{112122}}{120960} \right]$$

$$\begin{aligned}
 & \frac{\overline{112212}}{120960} - \frac{\overline{112222}}{120960} - \frac{\overline{121212}}{362880} - \frac{\overline{121222}}{120960} - \frac{\overline{122122}}{241920} - \frac{\overline{122222}}{120960}, \\
 0, & \frac{\overline{11111112}}{4838400} + \frac{\overline{11111122}}{4838400} + \frac{\overline{11111212}}{4838400} + \frac{\overline{11111222}}{4838400} + \frac{\overline{11112112}}{4838400} + \\
 & \frac{\overline{11112122}}{4838400} + \frac{\overline{11112212}}{4838400} + \frac{\overline{11112222}}{4838400} + \frac{\overline{11121112}}{9676800} + \frac{\overline{11121122}}{4838400} + \\
 & \frac{\overline{11121212}}{4838400} + \frac{\overline{11121222}}{4838400} + \frac{\overline{11122112}}{4838400} + \frac{\overline{11122122}}{4838400} + \frac{\overline{11122212}}{4838400} + \\
 & \frac{\overline{11122222}}{4838400} + \frac{\overline{11211122}}{4838400} + \frac{\overline{11211222}}{4838400} + \frac{\overline{11212122}}{4838400} + \frac{\overline{11212212}}{4838400} + \\
 & \frac{\overline{11212222}}{4838400} + \frac{\overline{11221122}}{9676800} + \frac{\overline{11221212}}{4838400} + \frac{\overline{11221222}}{4838400} + \frac{\overline{11222122}}{4838400} + \\
 & \frac{\overline{11222212}}{4838400} + \frac{\overline{11222222}}{4838400} + \frac{\overline{12121212}}{19353600} + \frac{\overline{12121222}}{4838400} + \frac{\overline{12122122}}{4838400} + \\
 & \frac{\overline{12122222}}{4838400} + \frac{\overline{12212222}}{4838400} + \frac{\overline{12221222}}{9676800} + \frac{\overline{12222222}}{4838400} \Big] \Big], \\
 M \Big[& \{1 \rightarrow \text{LS}[0, 0, 0, 0, 0, 0, 0, 0, 0]\}, \text{CWS} \Big[0, -\frac{11}{96}, 0, \frac{1111}{11520}, \\
 & 0, -\frac{111111}{725760}, 0, \frac{11111111}{38707200} \Big] \Big] \Big\}
 \end{aligned}$$

Save["WKOSolution8-1.m", {αs, βs, γs, ks}]

VerticalFlipEq[8, V]

{0, 0, 0}

sol9 = Solve[(# == 0) & /@ Union[μCoefficients[{
 HardR4[10, V], TwistEq[9, V], UnitarityEq[9, V], CapEq[9, V, C]
 }]]]

$$\begin{aligned}
 & \left\{ \left\{ \alpha_s[9, 1] \rightarrow 0, \alpha_s[9, 3] \rightarrow 0, \beta_s[9, 1] \rightarrow -\frac{1}{9830400}, \alpha_s[9, 9] \rightarrow 0, \alpha_s[9, 56] \rightarrow 0, \right. \right. \\
 & \alpha_s[9, 2] \rightarrow 0, \alpha_s[9, 5] \rightarrow 0, \alpha_s[9, 48] \rightarrow 0, \beta_s[9, 2] \rightarrow \frac{43}{88473600}, \alpha_s[9, 4] \rightarrow 0, \\
 & \alpha_s[9, 11] \rightarrow 0, \beta_s[9, 3] \rightarrow \frac{1271}{619315200}, \alpha_s[9, 53] \rightarrow 0, \alpha_s[9, 6] \rightarrow 0, \alpha_s[9, 7] \rightarrow 0, \\
 & \alpha_s[9, 30] \rightarrow 0, \beta_s[9, 4] \rightarrow -\frac{91}{88473600}, \alpha_s[9, 8] \rightarrow 0, \alpha_s[9, 54] \rightarrow 0, \\
 & \beta_s[9, 5] \rightarrow \frac{6589}{2786918400}, \alpha_s[9, 13] \rightarrow 0, \alpha_s[9, 10] \rightarrow 0, \alpha_s[9, 39] \rightarrow 0, \\
 & \beta_s[9, 6] \rightarrow -\frac{13}{1474560}, \alpha_s[9, 12] \rightarrow 0, \alpha_s[9, 47] \rightarrow 0, \beta_s[9, 7] \rightarrow -\frac{14867}{928972800}, \\
 & \left. \left. \alpha_s[9, 15] \rightarrow 0, \alpha_s[9, 14] \rightarrow 0, \alpha_s[9, 16] \rightarrow 0, \beta_s[9, 8] \rightarrow \frac{19}{14745600}, \alpha_s[9, 20] \rightarrow 0, \right. \right\}
 \end{aligned}$$

$$\begin{aligned}
 &\beta_s[9, 9] \rightarrow -\frac{533}{5\,573\,836\,800}, \alpha_s[9, 18] \rightarrow 0, \alpha_s[9, 55] \rightarrow 0, \alpha_s[9, 17] \rightarrow 0, \alpha_s[9, 43] \rightarrow 0, \\
 &\beta_s[9, 10] \rightarrow \frac{863}{1\,857\,945\,600}, \alpha_s[9, 19] \rightarrow 0, \alpha_s[9, 35] \rightarrow 0, \beta_s[9, 11] \rightarrow \frac{58\,651}{3\,344\,302\,080}, \\
 &\alpha_s[9, 50] \rightarrow 0, \alpha_s[9, 22] \rightarrow 0, \alpha_s[9, 21] \rightarrow 0, \alpha_s[9, 25] \rightarrow 0, \alpha_s[9, 23] \rightarrow 0, \\
 &\beta_s[9, 12] \rightarrow \frac{389}{44\,236\,800}, \beta_s[9, 13] \rightarrow -\frac{40\,511}{5\,573\,836\,800}, \alpha_s[9, 27] \rightarrow 0, \alpha_s[9, 46] \rightarrow 0, \\
 &\alpha_s[9, 24] \rightarrow 0, \alpha_s[9, 26] \rightarrow 0, \beta_s[9, 14] \rightarrow \frac{173}{22\,118\,400}, \alpha_s[9, 29] \rightarrow 0, \alpha_s[9, 33] \rightarrow 0, \\
 &\beta_s[9, 15] \rightarrow \frac{22\,289}{2\,786\,918\,400}, \alpha_s[9, 28] \rightarrow 0, \beta_s[9, 16] \rightarrow -\frac{1}{1\,105\,920}, \alpha_s[9, 45] \rightarrow 0, \\
 &\beta_s[9, 17] \rightarrow -\frac{127}{557\,383\,680}, \alpha_s[9, 51] \rightarrow 0, \beta_s[9, 18] \rightarrow \frac{158\,057}{16\,721\,510\,400}, \alpha_s[9, 31] \rightarrow 0, \\
 &\alpha_s[9, 32] \rightarrow 0, \beta_s[9, 19] \rightarrow -\frac{5483}{928\,972\,800}, \alpha_s[9, 34] \rightarrow 0, \beta_s[9, 20] \rightarrow \frac{221}{1\,672\,151\,040}, \\
 &\alpha_s[9, 52] \rightarrow 0, \alpha_s[9, 36] \rightarrow 0, \beta_s[9, 21] \rightarrow -\frac{41}{5\,529\,600}, \alpha_s[9, 38] \rightarrow 0, \\
 &\beta_s[9, 22] \rightarrow -\frac{4979}{418\,037\,760}, \alpha_s[9, 37] \rightarrow 0, \beta_s[9, 23] \rightarrow -\frac{1}{102\,400}, \alpha_s[9, 40] \rightarrow 0, \\
 &\beta_s[9, 24] \rightarrow \frac{11}{398\,131\,200}, \alpha_s[9, 44] \rightarrow 0, \beta_s[9, 25] \rightarrow -\frac{79\,081}{2\,786\,918\,400}, \alpha_s[9, 41] \rightarrow 0, \\
 &\alpha_s[9, 42] \rightarrow 0, \beta_s[9, 26] \rightarrow -\frac{43}{49\,766\,400}, \beta_s[9, 27] \rightarrow \frac{143}{348\,364\,800}, \beta_s[9, 28] \rightarrow \frac{1217}{49\,766\,400}, \\
 &\beta_s[9, 29] \rightarrow \frac{2113}{348\,364\,800}, \beta_s[9, 30] \rightarrow \frac{1}{2\,764\,800}, \beta_s[9, 31] \rightarrow -\frac{1}{6\,531\,840}, \\
 &\beta_s[9, 32] \rightarrow \frac{5}{13\,934\,592}, \beta_s[9, 33] \rightarrow \frac{1}{4\,354\,560}, \beta_s[9, 34] \rightarrow -\frac{1}{13\,271\,040}, \\
 &\alpha_s[9, 49] \rightarrow 0, \beta_s[9, 35] \rightarrow \frac{7}{238\,878\,720}, \beta_s[9, 36] \rightarrow -\frac{1217}{69\,672\,960}, \beta_s[9, 37] \rightarrow \frac{1}{61\,440}, \\
 &\beta_s[9, 38] \rightarrow \frac{1}{3\,483\,648}, \beta_s[9, 39] \rightarrow \frac{1217}{174\,182\,400}, \beta_s[9, 40] \rightarrow -\frac{1}{12\,441\,600}, \beta_s[9, 41] \rightarrow 0, \\
 &\beta_s[9, 42] \rightarrow 0, \beta_s[9, 43] \rightarrow \frac{1}{61\,440}, \beta_s[9, 44] \rightarrow 0, \beta_s[9, 45] \rightarrow -\frac{1}{24\,883\,200}, \\
 &\beta_s[9, 46] \rightarrow 0, \beta_s[9, 47] \rightarrow -\frac{1}{8\,709\,120}, \beta_s[9, 48] \rightarrow 0, \beta_s[9, 49] \rightarrow 0, \beta_s[9, 50] \rightarrow 0, \\
 &\beta_s[9, 51] \rightarrow 0, \beta_s[9, 52] \rightarrow 0, \beta_s[9, 53] \rightarrow 0, \beta_s[9, 54] \rightarrow 0, \beta_s[9, 55] \rightarrow 0, \\
 &\beta_s[9, 56] \rightarrow 0, \gamma_s[9, 1] \rightarrow 0, \gamma_s[9, 2] \rightarrow 0, \gamma_s[9, 3] \rightarrow 0, \gamma_s[9, 4] \rightarrow 0, \gamma_s[9, 5] \rightarrow 0, \\
 &\gamma_s[9, 6] \rightarrow 0, \gamma_s[9, 7] \rightarrow 0, \gamma_s[9, 8] \rightarrow 0, \gamma_s[9, 9] \rightarrow 0, \gamma_s[9, 10] \rightarrow 0, \gamma_s[9, 11] \rightarrow 0, \\
 &\gamma_s[9, 12] \rightarrow 0, \gamma_s[9, 13] \rightarrow 0, \gamma_s[9, 14] \rightarrow 0, \gamma_s[9, 15] \rightarrow 0, \gamma_s[9, 16] \rightarrow 0, \gamma_s[9, 17] \rightarrow 0, \\
 &\gamma_s[9, 18] \rightarrow 0, \gamma_s[9, 19] \rightarrow 0, \gamma_s[9, 20] \rightarrow 0, \gamma_s[9, 21] \rightarrow 0, \gamma_s[9, 22] \rightarrow 0, \gamma_s[9, 23] \rightarrow 0, \\
 &\gamma_s[9, 24] \rightarrow 0, \gamma_s[9, 25] \rightarrow 0, \gamma_s[9, 26] \rightarrow 0, \gamma_s[9, 27] \rightarrow 0, \gamma_s[9, 28] \rightarrow 0, \gamma_s[9, 29] \rightarrow 0, \\
 &\gamma_s[9, 30] \rightarrow 0, \gamma_s[9, 31] \rightarrow 0, \gamma_s[9, 32] \rightarrow 0, \gamma_s[9, 33] \rightarrow 0, \gamma_s[9, 34] \rightarrow 0, \gamma_s[9, 35] \rightarrow 0, \\
 &\gamma_s[9, 36] \rightarrow 0, \gamma_s[9, 37] \rightarrow 0, \gamma_s[9, 38] \rightarrow 0, \gamma_s[9, 39] \rightarrow 0, \gamma_s[9, 40] \rightarrow 0, \\
 &\gamma_s[9, 41] \rightarrow 0, \gamma_s[9, 42] \rightarrow 0, \gamma_s[9, 43] \rightarrow 0, \gamma_s[9, 44] \rightarrow 0, \gamma_s[9, 45] \rightarrow 0, \\
 &\gamma_s[9, 46] \rightarrow 0, \gamma_s[9, 47] \rightarrow 0, \gamma_s[9, 48] \rightarrow 0, \gamma_s[9, 49] \rightarrow 0, \gamma_s[9, 50] \rightarrow 0, \\
 &\gamma_s[9, 51] \rightarrow 0, \gamma_s[9, 52] \rightarrow 0, \gamma_s[9, 53] \rightarrow 0, \gamma_s[9, 54] \rightarrow 0, \gamma_s[9, 55] \rightarrow 0,
 \end{aligned}$$

$$\gamma_S[9, 56] \rightarrow 0, \gamma_S[9, 57] \rightarrow 0, \gamma_S[9, 58] \rightarrow 0, \gamma_S[9, 59] \rightarrow 0, \gamma_S[9, 60] \rightarrow 0 \}}}$$

sol9 /. Rule -> Set; \$SeriesShowDegree = 9; {V, C}

$$\left\{ M \left[\left\{ 1 \rightarrow LS \left[0, -\frac{\overline{12}}{24}, 0, \frac{\overline{71112}}{5760} - \frac{\overline{71122}}{5760} + \frac{\overline{1222}}{1440}, 0, \right. \right. \right. \right. \\ - \frac{\overline{3111112}}{967680} + \frac{\overline{3111122}}{483840} - \frac{\overline{8311222}}{967680} - \frac{\overline{3111222}}{725760} - \frac{\overline{3111212}}{645120} + \\ \frac{\overline{13112222}}{241920} + \frac{\overline{10112222}}{1451520} + \frac{\overline{527112212}}{5806080} - \frac{\overline{122222}}{60480}, 0, \\ \frac{\overline{1271111112}}{154828800} - \frac{\overline{1271111122}}{51609600} + \frac{\overline{23991111222}}{464486400} + \frac{\overline{458911112122}}{348364800} + \\ \frac{\overline{12711111212}}{30965760} - \frac{\overline{289311112222}}{464486400} - \frac{\overline{2539911121222}}{1393459200} + \frac{\overline{578311112212}}{696729600} + \\ \frac{\overline{27111122222}}{58060800} + \frac{\overline{323911212122}}{174182400} + \frac{\overline{166111212222}}{87091200} + \frac{\overline{1911121122}}{9289728} - \\ \frac{\overline{12711112112}}{77414400} - \frac{\overline{1409911122122}}{696729600} - \frac{\overline{1648311122212}}{1393459200} - \\ \frac{\overline{193311221222}}{348364800} - \frac{\overline{73311121212}}{23224320} - \frac{\overline{1911222222}}{9676800} + \frac{\overline{62912121222}}{12902400} - \\ \frac{\overline{49312122222}}{29030400} + \frac{\overline{685711211222}}{464486400} - \frac{\overline{754911211212}}{348364800} + \\ \frac{\overline{373311122112}}{232243200} + \frac{\overline{990711212212}}{348364800} - \frac{\overline{29911222122}}{5529600} - \frac{\overline{12111222212}}{7257600} - \\ \left. \frac{\overline{4912212222}}{1382400} - \frac{\overline{12122122}}{30720} + \frac{\overline{44911221212}}{9676800} + \frac{\overline{12222222}}{2419200}, 0 \right\},$$

$$\begin{aligned}
 2 \rightarrow \text{LS} & \left[\frac{1}{2}, -\frac{12}{12}, 0, \frac{1112}{5760} - \frac{1}{720} \frac{11222}{11222} + \frac{1}{720} \frac{11222}{12222}, -\frac{11112}{7680} + \frac{11122}{3840} - \frac{11212}{6912}, \right. \\
 & -\frac{111112}{645120} + \frac{23111122}{483840} - \frac{131112222}{161280} - \frac{112122}{22680} \\
 & \frac{41111212}{580608} + \frac{1122222}{15120} + \frac{1212222}{12096} + \frac{71112212}{483840} - \frac{1222222}{30240}, \\
 & \frac{1111112}{258048} - \frac{51111122}{387072} + \frac{11112222}{64512} + \frac{1112122}{96768} + \frac{51111212}{290304} - \frac{11122222}{96768} \\
 & \frac{1711212222}{1451520} - \frac{1112212}{60480} - \frac{1121122}{207360} - \frac{71112112}{1658880} + \frac{1122212}{207360}, \\
 & \frac{11111112}{77414400} - \frac{5871111122}{464486400} + \frac{25311112222}{66355200} - \frac{342711112122}{348364800} + \\
 & \frac{92911111212}{55738368} - \frac{43111122222}{7257600} + \frac{29111212222}{24883200} - \frac{469711112212}{99532800} + \\
 & \frac{7311122222}{14515200} + \frac{4111212122}{5443200} - \frac{11212222}{1088640} + \frac{28111121122}{92897280} + \\
 & \frac{79711112112}{232243200} - \frac{11122122}{108864} + \frac{199111222212}{174182400} - \frac{131311221222}{87091200} + \\
 & \frac{27111121212}{30965760} - \frac{11222222}{403200} + \frac{245912121222}{87091200} - \frac{12122222}{172800} + \\
 & \frac{4711211222}{6451200} - \frac{565311211212}{1393459200} + \frac{228111122112}{464486400} + \frac{15111212212}{14515200} - \\
 & \frac{11222122}{92160} - \frac{15111222212}{14515200} - \frac{12212222}{172800} - \frac{39111221212}{17418240} + \frac{12222222}{1209600}
 \end{aligned}$$

$$\begin{array}{r}
 \overline{111111112} \\
 9830400
 \end{array}
 +
 \begin{array}{r}
 \overline{4311111122} \\
 88473600
 \end{array}
 -
 \begin{array}{r}
 \overline{9111111222} \\
 88473600
 \end{array}
 -
 \begin{array}{r}
 \overline{13111112122} \\
 1474560
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{127111111212} \\
 619315200
 \end{array}
 +
 \begin{array}{r}
 \overline{19111112222} \\
 14745600
 \end{array}
 +
 \begin{array}{r}
 \overline{389111121222} \\
 44236800
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{14867111112212} \\
 928972800
 \end{array}
 -
 \begin{array}{r}
 \overline{111122222} \\
 1105920
 \end{array}
 -
 \begin{array}{r}
 \overline{41111212122} \\
 5529600
 \end{array}
 -
 \begin{array}{r}
 \overline{111212222} \\
 102400
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{863111121122} \\
 1857945600
 \end{array}
 +
 \begin{array}{r}
 \overline{6589111112112} \\
 2786918400
 \end{array}
 +
 \begin{array}{r}
 \overline{173111122122} \\
 22118400
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{22289111122212} \\
 2786918400
 \end{array}
 -
 \begin{array}{r}
 \overline{43111221222} \\
 49766400
 \end{array}
 +
 \begin{array}{r}
 \overline{58651111121212} \\
 3344302080
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{111222222} \\
 2764800
 \end{array}
 -
 \begin{array}{r}
 \overline{1217112121222} \\
 69672960
 \end{array}
 +
 \begin{array}{r}
 \overline{1217112122222} \\
 174182400
 \end{array}
 -
 \begin{array}{r}
 \overline{5483111211222} \\
 928972800
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{158057111211212} \\
 16721510400
 \end{array}
 -
 \begin{array}{r}
 \overline{40511111122112} \\
 5573836800
 \end{array}
 -
 \begin{array}{r}
 \overline{4979111212212} \\
 418037760
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{1217111222122} \\
 49766400
 \end{array}
 +
 \begin{array}{r}
 \overline{2113111222212} \\
 348364800
 \end{array}
 +
 \begin{array}{r}
 \overline{112212222} \\
 61440
 \end{array}
 +
 \begin{array}{r}
 \overline{112122122} \\
 61440
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{79081111221212} \\
 2786918400
 \end{array}
 -
 \begin{array}{r}
 \overline{112112122} \\
 6531840
 \end{array}
 +
 \begin{array}{r}
 \overline{112112222} \\
 4354560
 \end{array}
 +
 \begin{array}{r}
 \overline{5112112212} \\
 13934592
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{127111211122} \\
 557383680
 \end{array}
 -
 \begin{array}{r}
 \overline{533111121112} \\
 5573836800
 \end{array}
 +
 \begin{array}{r}
 \overline{11111221122} \\
 398131200
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{143111222112} \\
 348364800
 \end{array}
 -
 \begin{array}{r}
 \overline{112211222} \\
 12441600
 \end{array}
 +
 \begin{array}{r}
 \overline{112122212} \\
 3483648
 \end{array}
 +
 \begin{array}{r}
 \overline{221111212112} \\
 1672151040
 \end{array}
 -$$

$$\left. \left. \left. \frac{\overline{112221222}}{24883200} - \frac{\overline{112222212}}{8709120} - \frac{\overline{112121122}}{13271040} + \frac{7\overline{112121212}}{238878720} \right\} \right\},$$

$$\text{CWS} \left[0, -\frac{\overline{12}}{48}, 0, \frac{\overline{1112}}{2880} + \frac{\overline{1122}}{2880} + \frac{\overline{1212}}{5760} + \frac{\overline{1222}}{2880}, 0, \right.$$

$$-\frac{\overline{111112}}{120960} - \frac{\overline{111122}}{120960} - \frac{\overline{111212}}{120960} - \frac{\overline{111222}}{120960} - \frac{\overline{112112}}{241920} - \frac{\overline{112122}}{120960} -$$

$$\frac{\overline{112212}}{120960} - \frac{\overline{112222}}{120960} - \frac{\overline{121212}}{362880} - \frac{\overline{121222}}{120960} - \frac{\overline{122122}}{241920} - \frac{\overline{122222}}{120960},$$

$$0, \frac{\overline{11111112}}{4838400} + \frac{\overline{11111122}}{4838400} + \frac{\overline{11111212}}{4838400} + \frac{\overline{11111222}}{4838400} + \frac{\overline{11112112}}{4838400} +$$

$$\frac{\overline{11112122}}{4838400} + \frac{\overline{11112212}}{4838400} + \frac{\overline{11112222}}{4838400} + \frac{\overline{11121112}}{9676800} + \frac{\overline{11121122}}{4838400} +$$

$$\frac{\overline{11121212}}{4838400} + \frac{\overline{11121222}}{4838400} + \frac{\overline{11122112}}{4838400} + \frac{\overline{11122122}}{4838400} + \frac{\overline{11122212}}{4838400} +$$

$$\frac{\overline{11122222}}{4838400} + \frac{\overline{11211212}}{4838400} + \frac{\overline{11211222}}{4838400} + \frac{\overline{11212122}}{4838400} + \frac{\overline{11212212}}{4838400} +$$

$$\frac{\overline{11212222}}{4838400} + \frac{\overline{11221122}}{9676800} + \frac{\overline{11221212}}{4838400} + \frac{\overline{11221222}}{4838400} + \frac{\overline{11222122}}{4838400} +$$

$$\frac{\overline{11222212}}{4838400} + \frac{\overline{11222222}}{4838400} + \frac{\overline{12121212}}{19353600} + \frac{\overline{12121222}}{4838400} + \frac{\overline{12122122}}{4838400} +$$

$$\frac{\overline{12122222}}{4838400} + \frac{\overline{12212222}}{4838400} + \frac{\overline{12221222}}{9676800} + \frac{\overline{12222222}}{4838400}, 0 \left. \right] \left. \right\},$$

$$\text{M} \left[\{1 \rightarrow \text{LS}[0, 0, 0, 0, 0, 0, 0, 0, 0, 0]\}, \right.$$

$$\text{CWS} \left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11520}, 0, \right.$$

$$\left. \left. -\frac{\overline{111111}}{725760}, 0, \frac{\overline{11111111}}{38707200}, 0 \right] \right\}$$

VerticalFlipEq[9, V]

{0, 0, 0}

**sol10 = Solve[(# == 0) & /@ Union[μCoefficients[{
HardR4[11, V], TwistEq[10, V], UnitarityEq[10, V], CapEq[10, V, C]
}]]]**

$$\left\{ \left\{ \alpha_s[10, 1] \rightarrow -\frac{73}{3503554560}, \alpha_s[10, 9] \rightarrow -\frac{73}{1401421824}, \beta_s[10, 1] \rightarrow -\frac{1}{9809952768}, \right. \right.$$

$$\alpha_s[10, 3] \rightarrow -\frac{511}{2335703040}, \alpha_s[10, 99] \rightarrow -\frac{1}{95800320}, \alpha_s[10, 2] \rightarrow \frac{73}{875888640},$$

$$\left. \left. \alpha_s[10, 5] \rightarrow \frac{73}{350355456}, \beta_s[10, 2] \rightarrow \frac{1129}{35035545600}, \alpha_s[10, 88] \rightarrow \frac{5}{76640256}, \right. \right.$$

$$\begin{aligned}
 \alpha s[10, 4] &\rightarrow -\frac{1621}{6\,812\,467\,200}, \alpha s[10, 11] \rightarrow \frac{617\,777}{49\,049\,763\,840} + 10 \beta s[10, 96], \\
 \beta s[10, 3] &\rightarrow -\frac{1\,698\,659}{735\,746\,457\,600} - 2 \beta s[10, 96], \alpha s[10, 6] \rightarrow -\frac{18\,539}{6\,569\,164\,800} - 2 \beta s[10, 96], \\
 \alpha s[10, 95] &\rightarrow \frac{10\,013}{3\,832\,012\,800} + 2 \beta s[10, 96], \alpha s[10, 7] \rightarrow -\frac{471\,703}{105\,106\,636\,800} - 4 \beta s[10, 96], \\
 \alpha s[10, 8] &\rightarrow \frac{12\,941}{30\,656\,102\,400}, \beta s[10, 4] \rightarrow -\frac{34\,747}{245\,248\,819\,200}, \alpha s[10, 57] \rightarrow -\frac{59}{283\,852\,800}, \\
 \alpha s[10, 97] &\rightarrow \frac{1679}{191\,600\,640} + 7 \beta s[10, 96], \beta s[10, 5] \rightarrow \frac{194\,479}{122\,624\,409\,600} + \beta s[10, 96], \\
 \alpha s[10, 10] &\rightarrow \frac{45\,121}{35\,035\,545\,600} + \beta s[10, 96], \alpha s[10, 13] \rightarrow \frac{34\,229}{35\,035\,545\,600} + 2 \beta s[10, 96], \\
 \alpha s[10, 34] &\rightarrow \frac{1\,280\,467}{367\,873\,228\,800} + 3 \beta s[10, 96], \alpha s[10, 73] \rightarrow -\frac{4883}{1\,149\,603\,840} - \frac{5}{2} \beta s[10, 96], \\
 \beta s[10, 6] &\rightarrow \frac{116\,761}{61\,312\,204\,800} + \frac{5}{2} \beta s[10, 96], \alpha s[10, 12] \rightarrow \frac{383}{87\,091\,200} + \frac{5}{2} \beta s[10, 96], \\
 \alpha s[10, 87] &\rightarrow \frac{52\,807}{15\,328\,051\,200} + \frac{5}{2} \beta s[10, 96], \beta s[10, 7] \rightarrow \frac{25\,271}{3\,344\,302\,080} + \frac{15}{2} \beta s[10, 96], \\
 \alpha s[10, 15] &\rightarrow \frac{6\,461\,969}{735\,746\,457\,600} + \frac{15}{2} \beta s[10, 96], \alpha s[10, 14] \rightarrow \frac{65\,459}{6\,569\,164\,800} + \frac{15}{2} \beta s[10, 96], \\
 \alpha s[10, 31] &\rightarrow \frac{6103}{15\,328\,051\,200}, \beta s[10, 8] \rightarrow \frac{3349}{10\,218\,700\,800}, \alpha s[10, 16] \rightarrow -\frac{2281}{4\,541\,644\,800}, \\
 \beta s[10, 9] &\rightarrow \frac{270\,493}{245\,248\,819\,200} + \beta s[10, 96], \alpha s[10, 20] \rightarrow -\frac{2\,666\,999}{122\,624\,409\,600} - 19 \beta s[10, 96], \\
 \alpha s[10, 18] &\rightarrow \frac{4\,751\,993}{735\,746\,457\,600} + 5 \beta s[10, 96], \alpha s[10, 98] \rightarrow \frac{16\,699}{1\,916\,006\,400} + 7 \beta s[10, 96], \\
 \alpha s[10, 24] &\rightarrow \frac{2689}{1\,061\,683\,200} + 2 \beta s[10, 96], \alpha s[10, 17] \rightarrow \frac{16\,927}{17\,517\,772\,800} + \beta s[10, 96], \\
 \alpha s[10, 32] &\rightarrow -\frac{34\,997}{7\,664\,025\,600} - 4 \beta s[10, 96], \alpha s[10, 80] \rightarrow -\frac{7039}{851\,558\,400} - \frac{9}{2} \beta s[10, 96], \\
 \beta s[10, 10] &\rightarrow -\frac{1873}{3\,269\,984\,256} - \frac{1}{2} \beta s[10, 96], \alpha s[10, 19] \rightarrow -\frac{152\,807}{81\,749\,606\,400} - \frac{1}{2} \beta s[10, 96], \\
 \alpha s[10, 39] &\rightarrow \frac{317\,831}{16\,349\,921\,280} + 15 \beta s[10, 96], \beta s[10, 11] \rightarrow -\frac{2\,551\,573}{735\,746\,457\,600} - 5 \beta s[10, 96], \\
 \alpha s[10, 91] &\rightarrow -\frac{904\,049}{45\,984\,153\,600} - 15 \beta s[10, 96], \alpha s[10, 22] \rightarrow -\frac{35\,347}{973\,209\,600} - \frac{51}{2} \beta s[10, 96], \\
 \alpha s[10, 26] &\rightarrow -\frac{21\,706\,621}{367\,873\,228\,800} - 45 \beta s[10, 96], \\
 \alpha s[10, 21] &\rightarrow -\frac{1159}{82\,114\,560} - \frac{21}{2} \beta s[10, 96], \alpha s[10, 44] \rightarrow \frac{136\,127}{30\,656\,102\,400} + \frac{61}{32} \beta s[10, 96], \\
 \beta s[10, 12] &\rightarrow \frac{1}{20\,528\,640} - \frac{61}{32} \beta s[10, 96], \alpha s[10, 23] \rightarrow -\frac{30\,953}{7\,357\,464\,576} - \frac{61}{32} \beta s[10, 96], \\
 \alpha s[10, 86] &\rightarrow \frac{101\,197}{7\,664\,025\,600} + \frac{21}{2} \beta s[10, 96], \beta s[10, 13] \rightarrow -\frac{128\,077}{22\,295\,347\,200} - 3 \beta s[10, 96],
 \end{aligned}$$

$$\begin{aligned}
 \alpha_s[10, 28] &\rightarrow -\frac{255\,307}{122\,624\,409\,600} - 3\beta_s[10, 96], \alpha_s[10, 25] \rightarrow -\frac{24\,103}{8\,758\,886\,400} - 3\beta_s[10, 96], \\
 \alpha_s[10, 56] &\rightarrow -\frac{47\,701}{22\,992\,076\,800} - \frac{3}{32}\beta_s[10, 96], \\
 \alpha_s[10, 63] &\rightarrow -\frac{4831}{1\,703\,116\,800} - \frac{61}{32}\beta_s[10, 96], \beta_s[10, 14] \rightarrow \frac{5837}{15\,328\,051\,200} - 2\beta_s[10, 96], \\
 \alpha_s[10, 27] &\rightarrow -\frac{2\,119\,787}{367\,873\,228\,800} - \frac{125}{32}\beta_s[10, 96], \\
 \beta_s[10, 15] &\rightarrow -\frac{4493}{1\,513\,881\,600} - \frac{125}{32}\beta_s[10, 96], \\
 \alpha_s[10, 29] &\rightarrow -\frac{36\,703}{4\,541\,644\,800} - \frac{253}{32}\beta_s[10, 96], \\
 \alpha_s[10, 30] &\rightarrow -\frac{2\,094\,149}{735\,746\,457\,600} - \frac{125}{32}\beta_s[10, 96], \beta_s[10, 16] \rightarrow -\frac{4001}{8\,758\,886\,400}, \\
 \alpha_s[10, 83] &\rightarrow -\frac{2501}{5\,748\,019\,200} + \beta_s[10, 96], \beta_s[10, 17] \rightarrow \frac{80\,447}{30\,656\,102\,400} + \frac{5}{2}\beta_s[10, 96], \\
 \alpha_s[10, 33] &\rightarrow \frac{161\,587}{49\,049\,763\,840} + \frac{5}{2}\beta_s[10, 96], \alpha_s[10, 92] \rightarrow -\frac{105\,233}{5\,109\,350\,400} - \frac{31}{2}\beta_s[10, 96], \\
 \beta_s[10, 18] &\rightarrow -\frac{1\,606\,277}{735\,746\,457\,600} - \frac{7}{2}\beta_s[10, 96], \\
 \alpha_s[10, 35] &\rightarrow -\frac{77\,969}{8\,758\,886\,400} - \frac{11}{2}\beta_s[10, 96], \\
 \alpha_s[10, 36] &\rightarrow -\frac{29\,767\,223}{735\,746\,457\,600} - \frac{67}{2}\beta_s[10, 96], \\
 \alpha_s[10, 50] &\rightarrow \frac{739\,763}{91\,968\,307\,200} + \frac{151}{32}\beta_s[10, 96], \beta_s[10, 19] \rightarrow -\frac{110\,491}{40\,874\,803\,200} - \beta_s[10, 96], \\
 \alpha_s[10, 37] &\rightarrow \frac{17\,827}{49\,049\,763\,840} - \beta_s[10, 96], \alpha_s[10, 94] \rightarrow \frac{14\,647}{383\,201\,280} + \frac{61}{2}\beta_s[10, 96], \\
 \beta_s[10, 20] &\rightarrow -\frac{7499}{3\,832\,012\,800} - \frac{5}{2}\beta_s[10, 96], \alpha_s[10, 41] \rightarrow \frac{48\,227}{5\,255\,331\,840} + \frac{15}{2}\beta_s[10, 96], \\
 \alpha_s[10, 47] &\rightarrow \frac{17\,586\,761}{735\,746\,457\,600} + 21\beta_s[10, 96], \alpha_s[10, 38] \rightarrow \frac{50\,111}{13\,377\,208\,320} + \frac{5}{2}\beta_s[10, 96], \\
 \alpha_s[10, 67] &\rightarrow \frac{3557}{766\,402\,560} - \frac{1}{4}\beta_s[10, 96], \beta_s[10, 21] \rightarrow -\frac{69\,691}{30\,656\,102\,400} + \frac{49}{32}\beta_s[10, 96], \\
 \alpha_s[10, 40] &\rightarrow \frac{96\,577}{73\,574\,645\,760} + \frac{81}{32}\beta_s[10, 96], \\
 \alpha_s[10, 72] &\rightarrow -\frac{131\,413}{10\,218\,700\,800} - \frac{305}{32}\beta_s[10, 96], \\
 \beta_s[10, 22] &\rightarrow -\frac{103\,403}{10\,218\,700\,800} + \frac{5}{2}\beta_s[10, 96], \alpha_s[10, 42] \rightarrow \\
 &\frac{3937}{26\,276\,659\,200} - \frac{33}{32}\beta_s[10, 96], \alpha_s[10, 43] \rightarrow \frac{8\,792\,369}{735\,746\,457\,600} + \frac{231}{32}\beta_s[10, 96], \\
 \beta_s[10, 23] &\rightarrow -\frac{535}{919\,683\,072} + \frac{61}{32}\beta_s[10, 96], \alpha_s[10, 45] \rightarrow \frac{321\,179}{49\,049\,763\,840} + 6\beta_s[10, 96],
 \end{aligned}$$

$$\begin{aligned}
 \beta_s[10, 24] &\rightarrow \frac{9407}{61\,312\,204\,800}, \alpha_s[10, 85] \rightarrow \frac{44\,689}{2\,554\,675\,200} + 14 \beta_s[10, 96], \\
 \alpha_s[10, 55] &\rightarrow -\frac{428\,251}{91\,968\,307\,200} - \frac{9}{32} \beta_s[10, 96], \alpha_s[10, 75] \rightarrow \\
 &-\frac{187\,391}{30\,656\,102\,400} - \frac{77}{16} \beta_s[10, 96], \beta_s[10, 25] \rightarrow \frac{863}{2\,554\,675\,200} - \frac{29}{32} \beta_s[10, 96], \\
 \alpha_s[10, 46] &\rightarrow -\frac{44\,771}{30\,656\,102\,400} - \frac{61}{32} \beta_s[10, 96], \alpha_s[10, 84] \rightarrow \\
 &\frac{20\,819}{8\,360\,755\,200} + \frac{23}{32} \beta_s[10, 96], \beta_s[10, 26] \rightarrow -\frac{1\,887\,947}{183\,936\,614\,400} + \frac{159}{32} \beta_s[10, 96], \\
 \alpha_s[10, 49] &\rightarrow \frac{7\,841\,569}{367\,873\,228\,800} + \frac{255}{16} \beta_s[10, 96], \alpha_s[10, 48] \rightarrow \\
 &\frac{147\,253}{15\,328\,051\,200} + \frac{105}{16} \beta_s[10, 96], \alpha_s[10, 52] \rightarrow \frac{2\,954\,569}{147\,149\,291\,520} + \frac{267}{16} \beta_s[10, 96], \\
 \beta_s[10, 27] &\rightarrow \frac{56\,099}{61\,312\,204\,800} + \frac{45}{16} \beta_s[10, 96], \beta_s[10, 28] \rightarrow \frac{5303}{61\,312\,204\,800} - \frac{61}{32} \beta_s[10, 96], \\
 \alpha_s[10, 51] &\rightarrow -\frac{582\,863}{122\,624\,409\,600} - \frac{119}{32} \beta_s[10, 96], \\
 \alpha_s[10, 54] &\rightarrow -\frac{45\,817}{16\,349\,921\,280} - \frac{61}{32} \beta_s[10, 96], \\
 \beta_s[10, 29] &\rightarrow -\frac{689}{61\,312\,204\,800} - \frac{3}{16} \beta_s[10, 96], \\
 \alpha_s[10, 53] &\rightarrow -\frac{19\,757}{6\,131\,220\,480} - \frac{3}{16} \beta_s[10, 96], \beta_s[10, 30] \rightarrow \frac{10\,859}{8\,360\,755\,200} - \frac{3}{32} \beta_s[10, 96], \\
 \beta_s[10, 31] &\rightarrow \frac{1571}{3\,832\,012\,800}, \beta_s[10, 32] \rightarrow -\frac{3047}{955\,514\,880} - \frac{5}{2} \beta_s[10, 96], \\
 \alpha_s[10, 59] &\rightarrow \frac{7\,677\,623}{367\,873\,228\,800} + 17 \beta_s[10, 96], \alpha_s[10, 93] \rightarrow \frac{1\,031\,363}{45\,984\,153\,600} + 18 \beta_s[10, 96], \\
 \beta_s[10, 33] &\rightarrow \frac{15\,269}{40\,874\,803\,200}, \beta_s[10, 34] \rightarrow \frac{2143}{2\,874\,009\,600} + \beta_s[10, 96], \\
 \alpha_s[10, 96] &\rightarrow -\frac{233}{10\,948\,608} - 17 \beta_s[10, 96], \alpha_s[10, 58] \rightarrow -\frac{119\,033}{16\,721\,510\,400} - \frac{13}{2} \beta_s[10, 96], \\
 \alpha_s[10, 70] &\rightarrow \frac{23}{31\,539\,200}, \beta_s[10, 35] \rightarrow -\frac{4723}{1\,437\,004\,800} + \frac{61}{32} \beta_s[10, 96], \\
 \alpha_s[10, 60] &\rightarrow \frac{7\,345\,673}{735\,746\,457\,600} + \frac{61}{8} \beta_s[10, 96], \\
 \alpha_s[10, 79] &\rightarrow -\frac{75\,823}{8\,360\,755\,200} - \frac{251}{32} \beta_s[10, 96], \\
 \beta_s[10, 36] &\rightarrow -\frac{267\,661}{40\,874\,803\,200} - \frac{11}{8} \beta_s[10, 96], \\
 \alpha_s[10, 61] &\rightarrow \frac{101\,681}{40\,874\,803\,200} + \frac{21}{8} \beta_s[10, 96], \\
 \alpha_s[10, 62] &\rightarrow \frac{132\,101}{22\,992\,076\,800} + \frac{209}{32} \beta_s[10, 96],
 \end{aligned}$$

$$\begin{aligned}
\beta s[10, 37] &\rightarrow -\frac{323}{12\,262\,440\,960} - \frac{61}{32} \beta s[10, 96], \\
\alpha s[10, 71] &\rightarrow -\frac{260\,731}{13\,138\,329\,600} - \frac{275}{32} \beta s[10, 96], \\
\alpha s[10, 77] &\rightarrow -\frac{20\,501}{2\,090\,188\,800} - \frac{257}{32} \beta s[10, 96], \\
\beta s[10, 38] &\rightarrow \frac{360\,779}{367\,873\,228\,800} - \frac{17}{32} \beta s[10, 96], \\
\alpha s[10, 64] &\rightarrow \frac{53\,533}{49\,049\,763\,840} + \frac{47}{32} \beta s[10, 96], \beta s[10, 39] \rightarrow \frac{160\,531}{31\,531\,991\,040}, \\
\alpha s[10, 89] &\rightarrow \frac{250\,403}{19\,707\,494\,400} + 8 \beta s[10, 96], \alpha s[10, 65] \rightarrow \frac{3007}{328\,458\,240} + \frac{27}{4} \beta s[10, 96], \\
\alpha s[10, 76] &\rightarrow -\frac{24\,806\,053}{2\,207\,239\,372\,800} - \frac{159}{16} \beta s[10, 96], \\
\alpha s[10, 66] &\rightarrow \frac{1087}{5\,109\,350\,400} - \frac{27}{32} \beta s[10, 96], \\
\alpha s[10, 69] &\rightarrow -\frac{3\,462\,461}{551\,809\,843\,200} - \frac{177}{32} \beta s[10, 96], \\
\beta s[10, 40] &\rightarrow -\frac{32\,339}{26\,276\,659\,200} - \frac{11}{32} \beta s[10, 96], \\
\beta s[10, 41] &\rightarrow \frac{239}{66\,355\,200} + \frac{61}{32} \beta s[10, 96], \alpha s[10, 68] \rightarrow -\frac{9709}{3\,284\,582\,400} - \frac{75}{32} \beta s[10, 96], \\
\beta s[10, 42] &\rightarrow -\frac{3943}{2\,874\,009\,600} - \frac{79}{32} \beta s[10, 96], \\
\beta s[10, 43] &\rightarrow \frac{337\,973}{183\,936\,614\,400} - \frac{61}{16} \beta s[10, 96], \beta s[10, 44] \rightarrow \frac{1}{7\,983\,360} - \frac{5}{2} \beta s[10, 96], \\
\beta s[10, 45] &\rightarrow -\frac{1\,420\,889}{367\,873\,228\,800} - \frac{61}{32} \beta s[10, 96], \\
\alpha s[10, 81] &\rightarrow \frac{19\,669}{5\,748\,019\,200} + \frac{17}{8} \beta s[10, 96], \alpha s[10, 82] \rightarrow \frac{112\,943}{11\,496\,038\,400} + \frac{37}{8} \beta s[10, 96], \\
\alpha s[10, 74] &\rightarrow -\frac{4\,111\,993}{735\,746\,457\,600} - \frac{33}{8} \beta s[10, 96], \\
\beta s[10, 46] &\rightarrow -\frac{1963}{875\,888\,640} - \frac{93}{32} \beta s[10, 96], \beta s[10, 47] \rightarrow \frac{33\,857}{13\,624\,934\,400} + 2 \beta s[10, 96], \\
\beta s[10, 48] &\rightarrow \frac{48\,911}{15\,328\,051\,200} - \frac{21}{16} \beta s[10, 96], \beta s[10, 49] \rightarrow \frac{453\,757}{45\,984\,153\,600} + \frac{51}{32} \beta s[10, 96], \\
\alpha s[10, 78] &\rightarrow \frac{467}{185\,794\,560} + \frac{51}{32} \beta s[10, 96], \beta s[10, 50] \rightarrow \frac{14\,981}{11\,496\,038\,400} - 2 \beta s[10, 96], \\
\beta s[10, 51] &\rightarrow -\frac{12\,077}{30\,656\,102\,400}, \beta s[10, 52] \rightarrow \frac{91\,027}{20\,437\,401\,600} + \frac{17}{32} \beta s[10, 96], \\
\beta s[10, 53] &\rightarrow -\frac{683}{425\,779\,200} + 3 \beta s[10, 96], \beta s[10, 54] \rightarrow -\frac{41\,971}{61\,312\,204\,800}, \\
\beta s[10, 55] &\rightarrow \frac{1811}{718\,502\,400} + 8 \beta s[10, 96], \beta s[10, 56] \rightarrow \frac{6571}{22\,992\,076\,800} + \frac{5}{2} \beta s[10, 96],
\end{aligned}$$

$$\begin{aligned}
 \beta_s[10, 57] &\rightarrow -\frac{299}{1\,277\,337\,600}, \beta_s[10, 58] \rightarrow \frac{8033}{2\,874\,009\,600} + \frac{29}{32} \beta_s[10, 96], \\
 \beta_s[10, 59] &\rightarrow \frac{2\,383\,991}{551\,809\,843\,200} + \frac{17}{32} \beta_s[10, 96], \\
 \alpha_s[10, 90] &\rightarrow -\frac{23\,899}{2\,043\,740\,160} - \frac{243}{32} \beta_s[10, 96], \\
 \beta_s[10, 60] &\rightarrow \frac{158\,003}{36\,787\,322\,880} + \frac{61}{32} \beta_s[10, 96], \beta_s[10, 61] \rightarrow \frac{313}{319\,334\,400} + \frac{29}{32} \beta_s[10, 96], \\
 \beta_s[10, 62] &\rightarrow -\frac{26\,513}{5\,748\,019\,200} - 2 \beta_s[10, 96], \beta_s[10, 63] \rightarrow -\frac{611}{851\,558\,400}, \\
 \beta_s[10, 64] &\rightarrow -\frac{678\,851}{183\,936\,614\,400} - \frac{61}{32} \beta_s[10, 96], \\
 \beta_s[10, 65] &\rightarrow \frac{809}{143\,700\,480} + 2 \beta_s[10, 96], \beta_s[10, 66] \rightarrow \frac{607}{1\,703\,116\,800} - \frac{7}{16} \beta_s[10, 96], \\
 \beta_s[10, 67] &\rightarrow -\frac{41}{9\,580\,032} - 10 \beta_s[10, 96], \beta_s[10, 68] \rightarrow \frac{3101}{1\,459\,814\,400} + \frac{61}{32} \beta_s[10, 96], \\
 \beta_s[10, 69] &\rightarrow -\frac{163\,543}{55\,180\,984\,320} - \frac{61}{32} \beta_s[10, 96], \beta_s[10, 70] \rightarrow -\frac{1777}{522\,547\,200} - \frac{7}{2} \beta_s[10, 96], \\
 \beta_s[10, 71] &\rightarrow \frac{10\,673}{5\,748\,019\,200} + 15 \beta_s[10, 96], \beta_s[10, 72] \rightarrow -\frac{7549}{1\,277\,337\,600} - \frac{5}{2} \beta_s[10, 96], \\
 \beta_s[10, 73] &\rightarrow \frac{1}{2\,052\,864} + 2 \beta_s[10, 96], \beta_s[10, 74] \rightarrow -\frac{120\,259}{61\,312\,204\,800} - \frac{29}{32} \beta_s[10, 96], \\
 \beta_s[10, 75] &\rightarrow -\frac{821}{1\,916\,006\,400}, \beta_s[10, 76] \rightarrow -\frac{358\,201}{183\,936\,614\,400} + \frac{17}{32} \beta_s[10, 96], \\
 \beta_s[10, 77] &\rightarrow \frac{1549}{547\,430\,400} + \frac{5}{2} \beta_s[10, 96], \beta_s[10, 78] \rightarrow -\frac{1}{2\,395\,008} - \beta_s[10, 96], \\
 \beta_s[10, 79] &\rightarrow \frac{6253}{7\,664\,025\,600} + \frac{1}{2} \beta_s[10, 96], \beta_s[10, 80] \rightarrow \frac{2159}{1\,916\,006\,400} + 5 \beta_s[10, 96], \\
 \beta_s[10, 81] &\rightarrow -\frac{145}{76\,640\,256} - \frac{5}{2} \beta_s[10, 96], \beta_s[10, 82] \rightarrow \frac{90\,313}{7\,664\,025\,600} + 3 \beta_s[10, 96], \\
 \beta_s[10, 83] &\rightarrow -\frac{389}{718\,502\,400} + 2 \beta_s[10, 96], \beta_s[10, 84] \rightarrow \frac{129\,673}{22\,992\,076\,800} + \frac{5}{2} \beta_s[10, 96], \\
 \beta_s[10, 85] &\rightarrow \frac{389}{383\,201\,280}, \beta_s[10, 86] \rightarrow \frac{541}{638\,668\,800}, \beta_s[10, 87] \rightarrow \frac{767}{1\,277\,337\,600}, \\
 \beta_s[10, 88] &\rightarrow \frac{1}{11\,975\,040}, \beta_s[10, 89] \rightarrow \frac{7621}{656\,916\,480} + 5 \beta_s[10, 96], \\
 \beta_s[10, 90] &\rightarrow -\frac{4877}{766\,402\,560} - \beta_s[10, 96], \beta_s[10, 91] \rightarrow -\frac{791}{149\,299\,200} - 2 \beta_s[10, 96], \\
 \beta_s[10, 92] &\rightarrow -\frac{1217}{153\,280\,512} - 3 \beta_s[10, 96], \beta_s[10, 93] \rightarrow \frac{9179}{3\,832\,012\,800} + \beta_s[10, 96], \\
 \beta_s[10, 94] &\rightarrow -\frac{1}{5\,987\,520} - 2 \beta_s[10, 96], \beta_s[10, 95] \rightarrow \frac{1}{3\,548\,160}, \beta_s[10, 97] \rightarrow \frac{1}{1\,995\,840}, \\
 \beta_s[10, 98] &\rightarrow \frac{1}{2\,280\,960}, \beta_s[10, 99] \rightarrow -\frac{1}{47\,900\,160}, \gamma_s[10, 1] \rightarrow 0,
 \end{aligned}$$

$$\begin{aligned}
 \gamma_s[10, 2] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 3] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 4] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 5] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 6] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 7] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 8] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 9] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 10] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 11] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 12] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 13] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 14] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 15] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 16] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 17] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 18] \rightarrow -\frac{1}{383\,201\,280}, \gamma_s[10, 19] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 20] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 21] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 22] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 23] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 24] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 25] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 26] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 27] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 28] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 29] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 30] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 31] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 32] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 33] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 34] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 35] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 36] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 37] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 38] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 39] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 40] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 41] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 42] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 43] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 44] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 45] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 46] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 47] &\rightarrow -\frac{1}{383\,201\,280}, \gamma_s[10, 48] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 49] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 50] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 51] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 52] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 53] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 54] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 55] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 56] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 57] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 58] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 59] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 60] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 61] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 62] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 63] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 64] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 65] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 66] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 67] \rightarrow -\frac{1}{383\,201\,280},
 \end{aligned}$$

$$\begin{aligned}
 \gamma_s[10, 68] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 69] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 70] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 71] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 72] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 73] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 74] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 75] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 76] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 77] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 78] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 79] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 80] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 81] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 82] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 83] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 84] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 85] \rightarrow -\frac{1}{383\,201\,280}, \\
 \gamma_s[10, 86] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 87] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 88] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 89] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 90] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 91] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 92] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 93] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 94] \rightarrow -\frac{1}{958\,003\,200}, \\
 \gamma_s[10, 95] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 96] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 97] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 98] &\rightarrow -\frac{1}{383\,201\,280}, \gamma_s[10, 99] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 100] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 101] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 102] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 103] \rightarrow -\frac{1}{191\,600\,640}, \\
 \gamma_s[10, 104] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 105] \rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 106] \rightarrow -\frac{1}{383\,201\,280}, \\
 \gamma_s[10, 107] &\rightarrow -\frac{1}{191\,600\,640}, \gamma_s[10, 108] \rightarrow 0, \kappa_s[10] \rightarrow -\frac{1}{1\,916\,006\,400} \}
 \end{aligned}$$

$\beta_s[10, 96] = 0$; `sol10 /. Rule -> Set; $SeriesShowDegree = 10; {V, C}`

$$\begin{aligned}
 \left\{ M \left[\left\{ 1 \rightarrow LS \left[0, -\frac{12}{24}, 0, \frac{71112}{5760} - \frac{71122}{5760} + \frac{1222}{1440}, 0, \right. \right. \right. \\
 -\frac{31111112}{967680} + \frac{31111122}{483840} - \frac{83111222}{967680} - \frac{31112122}{725760} - \frac{31111212}{645120} + \\
 \frac{13112222}{241920} + \frac{101121222}{1451520} + \frac{527112212}{5806080} - \frac{122222}{60480}, 0, \\
 \left. \left. \left. \frac{1271111112}{154828800} - \frac{12711111122}{51609600} + \frac{239911111222}{464486400} + \frac{458911112122}{348364800} \right. \right. \right.
 \end{aligned}$$

$$\begin{array}{r}
 \overline{127\ 111\ 112\ 12} \\
 30\ 965\ 760
 \end{array}
 -
 \begin{array}{r}
 \overline{2893\ 111\ 122\ 22} \\
 464\ 486\ 400
 \end{array}
 -
 \begin{array}{r}
 \overline{25\ 399\ 1112\ 122\ 2} \\
 1\ 393\ 459\ 200
 \end{array}
 +
 \begin{array}{r}
 \overline{5783\ 111\ 122\ 12} \\
 696\ 729\ 600
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{271\ 11\ 122\ 222} \\
 58\ 060\ 800
 \end{array}
 +
 \begin{array}{r}
 \overline{3239\ 11212\ 122} \\
 174\ 182\ 400
 \end{array}
 +
 \begin{array}{r}
 \overline{1661\ 112\ 122\ 22} \\
 87\ 091\ 200
 \end{array}
 +
 \begin{array}{r}
 \overline{19\ 1\ 112\ 1122} \\
 9\ 289\ 728
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{127\ 11\ 112\ 112} \\
 77\ 414\ 400
 \end{array}
 -
 \begin{array}{r}
 \overline{14\ 099\ 11\ 122\ 122} \\
 696\ 729\ 600
 \end{array}
 -
 \begin{array}{r}
 \overline{16\ 483\ 11\ 122\ 212} \\
 1\ 393\ 459\ 200
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{1933\ 1\ 122\ 122\ 2} \\
 348\ 364\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{733\ 1\ 112\ 1212} \\
 23\ 224\ 320
 \end{array}
 -
 \begin{array}{r}
 \overline{19\ 1\ 122\ 2222} \\
 9\ 676\ 800
 \end{array}
 +
 \begin{array}{r}
 \overline{629\ 1212\ 122\ 2} \\
 12\ 902\ 400
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{493\ 12\ 122\ 222} \\
 29\ 030\ 400
 \end{array}
 +
 \begin{array}{r}
 \overline{6857\ 112\ 11222} \\
 464\ 486\ 400
 \end{array}
 -
 \begin{array}{r}
 \overline{7549\ 112\ 11212} \\
 348\ 364\ 800
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{3733\ 11\ 122\ 112} \\
 232\ 243\ 200
 \end{array}
 +
 \begin{array}{r}
 \overline{9907\ 112\ 122\ 12} \\
 348\ 364\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{299\ 1\ 122\ 2122} \\
 5\ 529\ 600
 \end{array}
 -
 \begin{array}{r}
 \overline{121\ 1\ 122\ 2212} \\
 7\ 257\ 600
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{49\ 122\ 122\ 22} \\
 1\ 382\ 400
 \end{array}
 -
 \begin{array}{r}
 \overline{12\ 122\ 122} \\
 30\ 720
 \end{array}
 +
 \begin{array}{r}
 \overline{449\ 1\ 122\ 1212} \\
 9\ 676\ 800
 \end{array}
 +
 \begin{array}{r}
 \overline{122\ 22222} \\
 2\ 419\ 200
 \end{array}
 ,$$

$$0, -
 \begin{array}{r}
 \overline{73\ 1111111112} \\
 3\ 503\ 554\ 560
 \end{array}
 +
 \begin{array}{r}
 \overline{73\ 1111111122} \\
 875\ 888\ 640
 \end{array}
 -
 \begin{array}{r}
 \overline{1621\ 1111111222} \\
 6\ 812\ 467\ 200
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{18\ 539\ 1111112122} \\
 6\ 569\ 164\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{511\ 1111111212} \\
 2\ 335\ 703\ 040
 \end{array}
 +
 \begin{array}{r}
 \overline{12\ 941\ 1111112222} \\
 30\ 656\ 102\ 400
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{383\ 1111121222} \\
 87\ 091\ 200
 \end{array}
 -
 \begin{array}{r}
 \overline{471\ 703\ 1111112212} \\
 105\ 106\ 636\ 800
 \end{array}
 -
 \begin{array}{r}
 \overline{2281\ 1111122222} \\
 4\ 541\ 644\ 800
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{1159\ 1111212122} \\
 82\ 114\ 560
 \end{array}
 -
 \begin{array}{r}
 \overline{30\ 953\ 1111212222} \\
 7\ 357\ 464\ 576
 \end{array}
 +
 \begin{array}{r}
 \overline{45\ 121\ 1111121122} \\
 35\ 035\ 545\ 600
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{731111112112} \\
 350355456
 \end{array}
 +
 \begin{array}{r}
 \overline{654591111122122} \\
 6569164800
 \end{array}
 +
 \begin{array}{r}
 \overline{64619691111122212} \\
 735746457600
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{21197871111221222} \\
 367873228800
 \end{array}
 +
 \begin{array}{r}
 \overline{6177771111121212} \\
 49049763840
 \end{array}
 +
 \begin{array}{r}
 \overline{61031111222222} \\
 15328051200
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{965771112121222} \\
 73574645760
 \end{array}
 +
 \begin{array}{r}
 \overline{1361271112122222} \\
 30656102400
 \end{array}
 -
 \begin{array}{r}
 \overline{1528071111211222} \\
 81749606400
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{47519931111211212} \\
 735746457600
 \end{array}
 +
 \begin{array}{r}
 \overline{342291111122112} \\
 35035545600
 \end{array}
 -
 \begin{array}{r}
 \overline{353471111212212} \\
 973209600
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{367031111222122} \\
 4541644800
 \end{array}
 -
 \begin{array}{r}
 \overline{20941491111222212} \\
 735746457600
 \end{array}
 +
 \begin{array}{r}
 \overline{7397631112212222} \\
 91968307200
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{39371112122122} \\
 26276659200
 \end{array}
 -
 \begin{array}{r}
 \overline{21706621111221212} \\
 367873228800
 \end{array}
 -
 \begin{array}{r}
 \overline{591112222222} \\
 283852800
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{30071121212122} \\
 328458240
 \end{array}
 +
 \begin{array}{r}
 \overline{35571121212222} \\
 766402560
 \end{array}
 +
 \begin{array}{r}
 \overline{231121221222} \\
 31539200
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{48831121222222} \\
 1149603840
 \end{array}
 -
 \begin{array}{r}
 \overline{779691112112122} \\
 8758886400
 \end{array}
 +
 \begin{array}{r}
 \overline{178271112112222} \\
 49049763840
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{297672231112112212} \\
 735746457600
 \end{array}
 +
 \begin{array}{r}
 \overline{169271111211122} \\
 17517772800
 \end{array}
 -
 \begin{array}{r}
 \overline{731111121112} \\
 1401421824
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{241031111221122} \\
 8758886400
 \end{array}
 -
 \begin{array}{r}
 \overline{2553071111222112} \\
 122624409600
 \end{array}
 -
 \begin{array}{r}
 \overline{447711112211222} \\
 30656102400
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{1472531112212122} \\
 15328051200
 \end{array}
 +
 \begin{array}{r}
 \overline{87923691112122212} \\
 735746457600
 \end{array}
 -
 \begin{array}{r}
 \overline{26669991111212112} \\
 122624409600
 \end{array}
 -$$

$\begin{array}{r} \overline{19\,757\,11\,122\,2\,122\,2} \\ \underline{} \\ 6\,131\,220\,480 \end{array}$	$\begin{array}{r} \overline{428\,251\,11\,122\,22\,122} \\ \underline{} \\ 91\,968\,307\,200 \end{array}$	$\begin{array}{r} \overline{47\,701\,11\,122\,222\,12} \\ \underline{} \\ 22\,992\,076\,800 \end{array}$
$\begin{array}{r} \overline{7039\,1\,122\,122\,222} \\ \underline{} \\ 851\,558\,400 \end{array}$	$\begin{array}{r} \overline{260\,731\,112\,122\,2\,122} \\ \underline{} \\ 13\,138\,329\,600 \end{array}$	$\begin{array}{r} \overline{50\,111\,1\,112\,121\,122} \\ \underline{} \\ 13\,377\,208\,320 \end{array}$
$\begin{array}{r} \overline{7\,841\,569\,11\,122\,122\,12} \\ \underline{} \\ 367\,873\,228\,800 \end{array}$	$\begin{array}{r} \overline{2\,954\,569\,11\,122\,212\,12} \\ \underline{} \\ 147\,149\,291\,520 \end{array}$	$\begin{array}{r} \overline{2501\,1\,122\,2\,122\,22} \\ \underline{} \\ 5\,748\,019\,200 \end{array}$
$\begin{array}{r} \overline{317\,831\,1\,112\,121212} \\ \underline{} \\ 16\,349\,921\,280 \end{array}$	$\begin{array}{r} \overline{5\,1\,122\,222222} \\ \underline{} \\ 76\,640\,256 \end{array}$	$\begin{array}{r} \overline{250\,403\,121212\,122\,2} \\ \underline{} \\ 19\,707\,494\,400 \end{array}$
$\begin{array}{r} \overline{904\,049\,1212\,122\,222} \\ \underline{} \\ 45\,984\,153\,600 \end{array}$	$\begin{array}{r} \overline{105\,233\,12\,122\,122\,22} \\ \underline{} \\ 5\,109\,350\,400 \end{array}$	$\begin{array}{r} \overline{23\,899\,1212\,122\,122} \\ \underline{} \\ 2\,043\,740\,160 \end{array}$
$\begin{array}{r} \overline{10\,013\,12\,122\,22222} \\ \underline{} \\ 3\,832\,012\,800 \end{array}$	$\begin{array}{r} \overline{7\,345\,673\,112\,112\,122\,2} \\ \underline{} \\ 735\,746\,457\,600 \end{array}$	$\begin{array}{r} \overline{4831\,112\,1\,122\,222} \\ \underline{} \\ 1\,703\,116\,800 \end{array}$
$\begin{array}{r} \overline{119\,033\,112\,112\,1\,122} \\ \underline{} \\ 16\,721\,510\,400 \end{array}$	$\begin{array}{r} \overline{101\,681\,112\,1\,122\,122} \\ \underline{} \\ 40\,874\,803\,200 \end{array}$	$\begin{array}{r} \overline{132\,101\,112\,1\,122\,212} \\ \underline{} \\ 22\,992\,076\,800 \end{array}$
$\begin{array}{r} \overline{7\,677\,623\,112\,112\,1212} \\ \underline{} \\ 367\,873\,228\,800 \end{array}$	$\begin{array}{r} \overline{161\,587\,1\,112\,11\,122\,2} \\ \underline{} \\ 49\,049\,763\,840 \end{array}$	$\begin{array}{r} \overline{34\,997\,1\,112\,1\,112\,12} \\ \underline{} \\ 7\,664\,025\,600 \end{array}$
$\begin{array}{r} \overline{2689\,111\,122\,1\,112} \\ \underline{} \\ 1\,061\,683\,200 \end{array}$	$\begin{array}{r} \overline{321\,179\,11\,122\,112\,12} \\ \underline{} \\ 49\,049\,763\,840 \end{array}$	$\begin{array}{r} \overline{48\,227\,1112\,122\,112} \\ \underline{} \\ 5\,255\,331\,840 \end{array}$
$\begin{array}{r} \overline{582\,863\,11\,122\,21\,122} \\ \underline{} \\ 122\,624\,409\,600 \end{array}$	$\begin{array}{r} \overline{45\,817\,11\,122\,22\,112} \\ \underline{} \\ 16\,349\,921\,280 \end{array}$	$\begin{array}{r} \overline{187\,391\,1\,122\,1\,122\,22} \\ \underline{} \\ 30\,656\,102\,400 \end{array}$
$\begin{array}{r} \overline{20\,501\,1\,122\,12\,122\,2} \\ \underline{} \\ 2\,090\,188\,800 \end{array}$	$\begin{array}{r} \overline{4\,111\,993\,1\,122\,1\,122\,12} \\ \underline{} \\ 735\,746\,457\,600 \end{array}$	$\begin{array}{r} \overline{9709\,112\,122\,1\,122} \\ \underline{} \\ 3\,284\,582\,400 \end{array}$

$$\begin{aligned}
 & \frac{1087 \overline{112} \overline{12} \overline{122} \overline{12}}{5109350400} - \frac{131413 \overline{112} \overline{122} \overline{22} \overline{12}}{10218700800} + \frac{17586761 \overline{11} \overline{122} \overline{12} \overline{112}}{735746457600} + \\
 & \frac{196691 \overline{122} \overline{212} \overline{122}}{5748019200} - \frac{758231 \overline{122} \overline{122} \overline{212}}{8360755200} + \frac{446891 \overline{122} \overline{22} \overline{122} \overline{2}}{2554675200} + \\
 & \frac{1011971 \overline{122} \overline{222} \overline{122}}{7664025600} + \frac{528071 \overline{122} \overline{222} \overline{212}}{15328051200} - \frac{233 \overline{122} \overline{122} \overline{122} \overline{2}}{10948608} + \\
 & \frac{1679 \overline{122} \overline{122} \overline{2222}}{191600640} + \frac{1031363 \overline{12} \overline{122} \overline{2} \overline{122} \overline{2}}{45984153600} + \frac{14647 \overline{12} \overline{122} \overline{22} \overline{122}}{383201280} + \\
 & \frac{53533 \overline{112} \overline{121} \overline{122} \overline{2}}{49049763840} + \frac{12804671 \overline{112} \overline{112} \overline{112}}{367873228800} + \frac{4671 \overline{122} \overline{122} \overline{122}}{185794560} - \\
 & \frac{3462461 \overline{112} \overline{122} \overline{1212}}{551809843200} + \frac{1129431 \overline{122} \overline{2} \overline{122} \overline{12}}{11496038400} + \frac{208191 \overline{122} \overline{22} \overline{1212}}{8360755200} + \\
 & \left. \frac{16699 \overline{122} \overline{2} \overline{122} \overline{222}}{1916006400} - \frac{248060531 \overline{122} \overline{1212} \overline{12}}{2207239372800} - \frac{\overline{122} \overline{222} \overline{222}}{95800320} \right], \\
 & 2 \rightarrow \text{LS} \left[\frac{1}{2}, -\frac{12}{12}, 0, \frac{1112}{5760} - \frac{1}{720} \overline{1122} + \frac{1}{720} \overline{1222}, -\frac{11112}{7680} + \frac{11122}{3840} - \frac{11212}{6912}, \right. \\
 & -\frac{111112}{645120} + \frac{23111122}{483840} - \frac{13111222}{161280} - \frac{112122}{22680} - \\
 & \frac{41111212}{580608} + \frac{112222}{15120} + \frac{121222}{12096} + \frac{71112212}{483840} - \frac{122222}{30240}, \\
 & \frac{1111112}{258048} - \frac{51111122}{387072} + \frac{1111222}{64512} + \frac{1112122}{96768} + \frac{51111212}{290304} - \frac{1112222}{96768} - \\
 & \left. \frac{171121222}{1451520} - \frac{1112212}{60480} - \frac{1121122}{207360} - \frac{71112112}{1658880} + \frac{1122212}{207360} \right],
 \end{aligned}$$

$$\begin{array}{r}
 \overline{11111112} - \overline{5871111122} + \overline{2531111222} - \overline{34271111222} + \\
 \hline
 77414400 - 464486400 + 66355200 - 348364800 + \\
 \\
 \overline{92911111212} - \overline{4311112222} + \overline{2911121222} - \overline{469711112212} + \\
 \hline
 55738368 - 7257600 + 24883200 - 99532800 + \\
 \\
 \overline{7311122222} + \overline{4111212122} - \overline{11212222} + \overline{28111121122} + \\
 \hline
 14515200 + 5443200 - 1088640 + 92897280 + \\
 \\
 \overline{79711112112} - \overline{11122122} + \overline{199111122212} - \overline{131311221222} + \\
 \hline
 232243200 - 108864 + 174182400 - 87091200 + \\
 \\
 \overline{27111121212} - \overline{11222222} + \overline{245912121222} - \overline{12122222} + \\
 \hline
 30965760 - 403200 + 87091200 - 172800 + \\
 \\
 \overline{4711211222} - \overline{565311211212} + \overline{228111122112} + \overline{15111212212} - \\
 \hline
 6451200 - 1393459200 + 464486400 + 14515200 - \\
 \\
 \overline{11222122} - \overline{15111222212} - \overline{12212222} - \overline{39111221212} + \overline{12222222} \\
 \hline
 92160 - 14515200 - 172800 - 17418240 + 1209600 \\
 \\
 \overline{111111112} + \overline{4311111122} - \overline{9111111222} - \overline{13111112122} + \\
 \hline
 9830400 + 88473600 - 88473600 - 1474560 + \\
 \\
 \overline{127111111212} + \overline{1911112222} + \overline{389111121222} - \\
 \hline
 619315200 + 14745600 + 44236800 - \\
 \\
 \overline{1486711112212} - \overline{111122222} - \overline{41111212122} - \overline{111212222} + \\
 \hline
 928972800 - 1105920 - 5529600 - 102400 + \\
 \\
 \overline{863111121122} + \overline{6589111112112} + \overline{173111122122} + \\
 \hline
 1857945600 + 2786918400 + 22118400 +
 \end{array}$$

$$\begin{aligned}
 & \frac{22289111122212}{2786918400} - \frac{43111221222}{49766400} + \frac{58651111121212}{3344302080} + \\
 & \frac{111222222}{2764800} - \frac{1217112121222}{69672960} + \frac{1217112122222}{174182400} - \frac{5483111211222}{928972800} + \\
 & \frac{158057111211212}{16721510400} - \frac{4051111122112}{5573836800} - \frac{4979111212212}{418037760} + \\
 & \frac{1217111222122}{49766400} + \frac{2113111222212}{348364800} + \frac{112212222}{61440} + \frac{112122122}{61440} - \\
 & \frac{79081111221212}{2786918400} - \frac{112112122}{6531840} + \frac{112112222}{4354560} + \frac{5112112212}{13934592} - \\
 & \frac{127111211122}{557383680} - \frac{533111121112}{5573836800} + \frac{11111221122}{398131200} + \\
 & \frac{143111222112}{348364800} - \frac{112211222}{12441600} + \frac{112122212}{3483648} + \frac{221111212112}{1672151040} - \\
 & \frac{112221222}{24883200} - \frac{11222212}{8709120} - \frac{112121122}{13271040} + \frac{7112121212}{238878720} + \\
 & - \frac{1111111112}{9809952768} + \frac{1129111111122}{35035545600} - \frac{34747111111222}{245248819200} + \\
 & \frac{1167611111112122}{61312204800} - \frac{1698659111111212}{735746457600} + \frac{3349111112222}{10218700800} + \\
 & \frac{1111121222}{20528640} + \frac{25271111112212}{3344302080} - \frac{4001111122222}{8758886400} -
 \end{aligned}$$

$$\begin{array}{r}
 \overline{69\ 691\ 111\ 12\ 12\ 12\ 2} \\
 \underline{30\ 656\ 102\ 400} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{535\ 111\ 12\ 12\ 2\ 2\ 2} \\
 \underline{919\ 683\ 072} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{1873\ 111\ 112\ 1\ 12\ 2} \\
 \underline{3\ 269\ 984\ 256} \\
 \hline
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{194\ 479\ 1111\ 112\ 112} \\
 \underline{122\ 624\ 409\ 600} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{5837\ 1111\ 122\ 122} \\
 \underline{15\ 328\ 051\ 200} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{4493\ 1111\ 122\ 212} \\
 \underline{1\ 513\ 881\ 600} \\
 \hline
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{56\ 099\ 111\ 122\ 122\ 2} \\
 \underline{61\ 312\ 204\ 800} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{2\ 551\ 573\ 111\ 112\ 1212} \\
 \underline{735\ 746\ 457\ 600} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{1571\ 111\ 122\ 2222} \\
 \underline{3\ 832\ 012\ 800} \\
 \hline
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{32\ 339\ 1112121222} \\
 \underline{26\ 276\ 659\ 200} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{1112122222} \\
 \underline{7\ 983\ 360} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{110\ 491\ 1111211222} \\
 \underline{40\ 874\ 803\ 200} \\
 \hline
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{1\ 606\ 277\ 1111211212} \\
 \underline{735\ 746\ 457\ 600} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{128\ 077\ 1111122112} \\
 \underline{22\ 295\ 347\ 200} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{103\ 403\ 1111212212} \\
 \underline{10\ 218\ 700\ 800} \\
 \hline
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{689\ 1111222122} \\
 \underline{61\ 312\ 204\ 800} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{10\ 859\ 1111222212} \\
 \underline{8\ 360\ 755\ 200} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{14\ 981\ 1112212222} \\
 \underline{11\ 496\ 038\ 400} \\
 \hline
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{3943\ 1112122122} \\
 \underline{2\ 874\ 009\ 600} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{1\ 887\ 947\ 1111221212} \\
 \underline{183\ 936\ 614\ 400} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{299\ 1112222222} \\
 \underline{1\ 277\ 337\ 600} \\
 \hline
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{809\ 1121212122} \\
 \underline{143\ 700\ 480} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{41\ 1121212222} \\
 \underline{9\ 580\ 032} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{1777\ 1121221222} \\
 \underline{522\ 547\ 200} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{1121222222} \\
 \underline{2\ 052\ 864} \\
 \hline
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{4723\ 1112112122} \\
 \underline{1\ 437\ 004\ 800} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{323\ 1112112222} \\
 \underline{12\ 262\ 440\ 960} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{267\ 661\ 1112112212} \\
 \underline{40\ 874\ 803\ 200} \\
 \hline
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{80\ 447\ 1111211122} \\
 \underline{30\ 656\ 102\ 400} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{270\ 493\ 1111121112} \\
 \underline{245\ 248\ 819\ 200} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{863\ 1111221122} \\
 \underline{2\ 554\ 675\ 200} \\
 \hline
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{5303\ 1111222112} \\
 \underline{61\ 312\ 204\ 800} \\
 \hline
 \end{array}
 -
 \begin{array}{r}
 \overline{1963\ 1112211222} \\
 \underline{875\ 888\ 640} \\
 \hline
 \end{array}
 +
 \begin{array}{r}
 \overline{48\ 911\ 1112212122} \\
 \underline{15\ 328\ 051\ 200} \\
 \hline
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{3379731112122212}}}}} \\
 183936614400
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{74991111212112}}}}} \\
 3832012800
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{6831112221222}}}}} \\
 425779200
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{18111112222122}}}}} \\
 718502400
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{65711112222212}}}}} \\
 22992076800
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{21591122122222}}}}} \\
 1916006400
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{106731121222122}}}}} \\
 5748019200
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{3607791112121122}}}}} \\
 367873228800
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{4537571112212212}}}}} \\
 45984153600
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{910271112221212}}}}} \\
 20437401600
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{3891122212222}}}}} \\
 718502400
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{1605311112121212}}}}} \\
 31531991040
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{112222222}}}}} \\
 11975040
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{76211212121222}}}}} \\
 656916480
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{791121212222}}}}} \\
 149299200
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{12171212212222}}}}} \\
 153280512
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{48771212122122}}}}} \\
 766402560
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{121222222}}}}} \\
 3548160
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{1580031121121222}}}}} \\
 36787322880
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{6111121122222}}}}} \\
 851558400
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{80331121121122}}}}} \\
 2874009600
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{3131121122122}}}}} \\
 319334400
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{265131121122212}}}}} \\
 5748019200
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{23839911121121212}}}}} \\
 551809843200
 \end{array}
 +$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{152691112111222}}}}} \\
 40874803200
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{30471112111212}}}}} \\
 955514880
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{94071111221112}}}}} \\
 61312204800
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{14208891112211212}}}}} \\
 367873228800
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{2391112122112}}}}} \\
 66355200
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{120771112221122}}}}} \\
 30656102400
 \end{array}
 -$$

$$\begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{419711112222112}}}}} \\
 61312204800
 \end{array}
 -
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{8211122112222}}}}} \\
 1916006400
 \end{array}
 +
 \begin{array}{r}
 \overline{\overline{\overline{\overline{\overline{15491122121222}}}}} \\
 547430400
 \end{array}
 -$$

$$\begin{aligned}
 & \frac{120\ 259\ 1\ 1\ 2\ 2\ 1\ 1\ 2\ 2\ 1\ 2}{61\ 312\ 204\ 800} + \frac{3101\ 1\ 1\ 2\ 1\ 2\ 2\ 1\ 1\ 2\ 2}{1\ 459\ 814\ 400} + \frac{607\ 1\ 1\ 2\ 1\ 2\ 1\ 2\ 2\ 1\ 2}{1\ 703\ 116\ 800} - \\
 & \frac{7549\ 1\ 1\ 2\ 1\ 2\ 2\ 2\ 2\ 1\ 2}{1\ 277\ 337\ 600} + \frac{33\ 857\ 1\ 1\ 1\ 2\ 2\ 1\ 2\ 1\ 1\ 2\ 2}{13\ 624\ 934\ 400} - \frac{145\ 1\ 1\ 2\ 2\ 2\ 1\ 2\ 1\ 2\ 2}{76\ 640\ 256} + \\
 & \frac{6253\ 1\ 1\ 2\ 2\ 1\ 2\ 2\ 2\ 1\ 2}{7\ 664\ 025\ 600} + \frac{389\ 1\ 1\ 2\ 2\ 2\ 2\ 1\ 2\ 2\ 2}{383\ 201\ 280} + \frac{541\ 1\ 1\ 2\ 2\ 2\ 2\ 2\ 1\ 2\ 2}{638\ 668\ 800} + \\
 & \frac{767\ 1\ 1\ 2\ 2\ 2\ 2\ 2\ 2\ 1\ 2}{1\ 277\ 337\ 600} + \frac{1\ 2\ 2\ 1\ 2\ 2\ 2\ 2\ 2\ 2}{1\ 995\ 840} + \frac{9179\ 1\ 2\ 1\ 2\ 2\ 2\ 1\ 2\ 2\ 2}{3\ 832\ 012\ 800} - \frac{1\ 2\ 1\ 2\ 2\ 2\ 2\ 1\ 2\ 2\ 2}{5\ 987\ 520} - \\
 & \frac{678\ 851\ 1\ 1\ 2\ 1\ 2\ 1\ 1\ 2\ 2\ 2}{183\ 936\ 614\ 400} + \frac{2143\ 1\ 1\ 1\ 2\ 1\ 1\ 2\ 1\ 1\ 2}{2\ 874\ 009\ 600} - \frac{1\ 1\ 2\ 2\ 1\ 2\ 2\ 1\ 2\ 2}{2\ 395\ 008} - \\
 & \frac{163\ 543\ 1\ 1\ 2\ 1\ 2\ 2\ 1\ 2\ 1\ 2}{55\ 180\ 984\ 320} + \frac{90\ 313\ 1\ 1\ 2\ 2\ 2\ 1\ 2\ 2\ 1\ 2}{7\ 664\ 025\ 600} + \frac{129\ 673\ 1\ 1\ 2\ 2\ 2\ 2\ 1\ 2\ 1\ 2}{22\ 992\ 076\ 800} + \\
 & \left. \left. \left. \frac{1\ 2\ 2\ 2\ 1\ 2\ 2\ 2\ 2\ 2}{2\ 280\ 960} - \frac{358\ 201\ 1\ 1\ 2\ 2\ 1\ 2\ 1\ 2\ 1\ 2}{183\ 936\ 614\ 400} - \frac{1\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2\ 2}{47\ 900\ 160} \right\} \right\} ,
 \end{aligned}$$

$$\begin{aligned}
 \text{CWS} & \left[0, -\frac{12}{48}, 0, \frac{1112}{2880} + \frac{1122}{2880} + \frac{1212}{5760} + \frac{1222}{2880}, 0, \right. \\
 & -\frac{111112}{120\ 960} - \frac{111122}{120\ 960} - \frac{111212}{120\ 960} - \frac{111222}{120\ 960} - \\
 & \frac{112112}{241\ 920} - \frac{112122}{120\ 960} - \frac{112212}{120\ 960} - \frac{112222}{120\ 960} - \\
 & \frac{121212}{362\ 880} - \frac{121222}{120\ 960} - \frac{122122}{241\ 920} - \frac{122222}{120\ 960}, 0, \\
 & \frac{11111112}{4\ 838\ 400} + \frac{1111122}{4\ 838\ 400} + \frac{1111212}{4\ 838\ 400} + \frac{1111222}{4\ 838\ 400} + \frac{1112112}{4\ 838\ 400} + \\
 & \frac{1112122}{4\ 838\ 400} + \frac{1112212}{4\ 838\ 400} + \frac{1112222}{4\ 838\ 400} + \frac{1121112}{9\ 676\ 800} + \\
 & \frac{11121122}{4\ 838\ 400} + \frac{11121212}{4\ 838\ 400} + \frac{11121222}{4\ 838\ 400} + \frac{11122112}{4\ 838\ 400} + \\
 & \frac{11122122}{4\ 838\ 400} + \frac{11122212}{4\ 838\ 400} + \frac{11122222}{4\ 838\ 400} + \frac{11211212}{4\ 838\ 400} +
 \end{aligned}$$

$$\begin{array}{r}
 \overline{11211222} + \overline{11212122} + \overline{11212212} + \overline{11212222} + \\
 4838400 + 4838400 + 4838400 + 4838400 + \\
 \overline{11221122} + \overline{11221212} + \overline{11221222} + \overline{11222122} + \\
 9676800 + 4838400 + 4838400 + 4838400 + \\
 \overline{11222212} + \overline{11222222} + \overline{12121212} + \overline{12121222} + \\
 4838400 + 4838400 + 19353600 + 4838400 + \\
 \overline{12122122} + \overline{12122222} + \overline{12212222} + \overline{12221222} + \overline{12222222} \\
 4838400 + 4838400 + 4838400 + 9676800 + 4838400 , \\
 0, - \frac{\overline{111111112}}{191600640} - \frac{\overline{1111111122}}{191600640} - \frac{\overline{111111212}}{191600640} - \frac{\overline{111111222}}{191600640} - \\
 \overline{111112112} - \overline{111112122} - \overline{111112212} - \\
 191600640 - 191600640 - 191600640 - \\
 \overline{111112222} - \overline{111121112} - \overline{111121122} - \overline{111121212} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111121222} - \overline{111122112} - \overline{111122122} - \overline{111122212} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111122222} - \overline{111211112} - \overline{111211122} - \overline{111211212} - \\
 191600640 - 383201280 - 191600640 - 191600640 - \\
 \overline{111211222} - \overline{111212112} - \overline{111212122} - \overline{111212212} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111212222} - \overline{111221112} - \overline{111221122} - \overline{111221212} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111221222} - \overline{111222112} - \overline{111222122} - \overline{111222212} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111222222} - \overline{111211122} - \overline{111211222} - \overline{111211212} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111212122} - \overline{111212212} - \overline{111212222} - \overline{111212112} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111212212} - \overline{111212222} - \overline{111221112} - \overline{111221122} - \\
 191600640 - 191600640 - 383201280 - 191600640 - \\
 \overline{111221122} - \overline{111221212} - \overline{111221222} - \overline{111221222} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111221222} - \overline{111222112} - \overline{111222122} - \overline{111222122} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{111222212} - \overline{111222212} - \overline{111222212} - \overline{111222222} - \\
 191600640 - 191600640 - 191600640 - 191600640 - \\
 \overline{112112112} - \overline{112112122} - \overline{112112122} - \overline{112112212} - \\
 191600640 - 191600640 - 191600640 - 191600640
 \end{array}$$

$$\left[\begin{array}{cccc} \overline{1121122212} & \overline{1121122222} & \overline{1121211212} & \overline{1121211222} \\ 191\,600\,640 & 191\,600\,640 & 383\,201\,280 & 191\,600\,640 \\ \overline{1121212122} & \overline{1121212212} & \overline{1121212222} & \overline{1121221122} \\ 191\,600\,640 & 191\,600\,640 & 191\,600\,640 & 191\,600\,640 \\ \overline{1121221212} & \overline{1121221222} & \overline{1121222122} & \overline{1121222212} \\ 191\,600\,640 & 191\,600\,640 & 191\,600\,640 & 191\,600\,640 \\ \overline{1121222222} & \overline{1122112212} & \overline{1122112222} & \overline{1122121212} \\ 191\,600\,640 & 191\,600\,640 & 191\,600\,640 & 191\,600\,640 \\ \overline{1122121222} & \overline{1122122122} & \overline{1122122212} & \overline{1122122222} \\ 191\,600\,640 & 191\,600\,640 & 191\,600\,640 & 191\,600\,640 \\ \overline{1122211222} & \overline{1122212122} & \overline{1122212212} & \overline{1122212222} \\ 383\,201\,280 & 191\,600\,640 & 191\,600\,640 & 191\,600\,640 \\ \overline{1122221212} & \overline{1122221222} & \overline{1122222122} & \overline{1122222212} \\ 191\,600\,640 & 191\,600\,640 & 191\,600\,640 & 191\,600\,640 \\ \overline{1122222222} & \overline{1212121212} & \overline{1212121222} & \overline{1212122122} \\ 191\,600\,640 & 958\,003\,200 & 191\,600\,640 & 191\,600\,640 \\ \overline{1212122222} & \overline{1212212122} & \overline{1212212222} & \overline{1212221222} \\ 191\,600\,640 & 383\,201\,280 & 191\,600\,640 & 191\,600\,640 \\ \overline{1212222122} & \overline{1212222222} & \overline{1221221222} & \overline{1221222222} \\ 191\,600\,640 & 191\,600\,640 & 191\,600\,640 & 191\,600\,640 \\ \overline{1222122222} & \overline{1222212222} & \overline{1222222222} & \\ 191\,600\,640 & 383\,201\,280 & 191\,600\,640 & \end{array} \right],$$

M[{1 → LS[0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0] },

$$\left. \begin{array}{l} \text{CWS} \left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11\,520}, \right. \\ 0, -\frac{\overline{111111}}{725\,760}, 0, \frac{\overline{11111111}}{38\,707\,200}, \\ \left. 0, -\frac{\overline{1111111111}}{1\,916\,006\,400} \right] \end{array} \right\}$$

Save["WKOSolution10.m", {αs, βs, γs, κs}]

C

M[{1 → LS[0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0] },

$$\text{CWS} \left[0, -\frac{\overline{11}}{96}, 0, \frac{\overline{1111}}{11\,520}, 0, -\frac{\overline{111111}}{725\,760}, 0, \frac{\overline{11111111}}{38\,707\,200}, 0, -\frac{\overline{1111111111}}{1\,916\,006\,400} \right]$$

Series[$\frac{1}{4} \text{Log} \left[\frac{e^{x/2} - e^{-x/2}}{x} \right]$, {x, 0, 10}]

$$\frac{x^2}{96} - \frac{x^4}{11\,520} + \frac{x^6}{725\,760} - \frac{x^8}{38\,707\,200} + \frac{x^{10}}{1\,916\,006\,400} + O[x]^{11}$$

```
TimeUsed[]
6178.03

VerticalFlipEq[10, V] // Timing
{1360.250720, {0, 0, 0}}

sol11 = Solve[ (# == 0) & /@ Union[ $\mu$ Coefficients[{
    HardR4[12, V], TwistEq[11, V], UnitarityEq[11, V], CapEq[11, V, C]
}]]]
$Aborted

sol11 /. Rule -> Set; $SeriesShowDegree = 11; {V, C}
C
Save["WKOSolution11.m", { $\alpha$ s,  $\beta$ s,  $\gamma$ s,  $\kappa$ s}]
VerticalFlipEq[11, V]
TimeUsed[] // Timing
```