

```
In[*]:= ES[s_][e_] := (EchoLabel[s][Short[e, 2]]); e);
```

```
In[*]:= $k = 1; $n = 3;
```

```
TTL = TTλ@Table[UCF[If[τ[g] == "x", λ, 1] (g*)i Δi→j,k[Ui[g]]], {g, $PBWGens}]
```

```
Out[*]=
```

$$\begin{aligned}
& e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \xi_{12_i} U_j[x_{12}] U_k[] + \\
& \left(e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \xi_{13_i} + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \lambda \xi_{12_i} \xi_{23_i} + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} \right) U_j[x_{13}] U_k[] + \\
& e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} \xi_{23_i} U_j[x_{23}] U_k[] + 2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \lambda \hbar \xi_{12_i} \xi_{13_i} U_j[x_{12}, x_{13}] U_k[] - \\
& 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} U_j[x_{12}, x_{23}] U_k[] + \\
& 2 e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda^2 \hbar \xi_{12_i} \xi_{13_i} \xi_{23_i} U_j[x_{13}, x_{13}] U_k[] + \\
& 2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \lambda \hbar \xi_{13_i} \xi_{23_i} U_j[x_{13}, x_{23}] U_k[] - 2 e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \in \hbar \xi_{12_i} U_j[x_{12}] U_k[a_1] + \\
& \left(-2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \hbar \xi_{13_i} - 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \lambda \hbar \xi_{12_i} \xi_{23_i} \right) U_j[x_{13}] U_k[a_1] + \\
& \left(-2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \hbar \xi_{13_i} - 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \lambda \hbar \xi_{12_i} \xi_{23_i} \right) U_j[x_{13}] U_k[a_2] - \\
& 2 e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} \in \hbar \xi_{23_i} U_j[x_{23}] U_k[a_2] + e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \xi_{12_i} U_j[] U_k[x_{12}] + \\
& 2 e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \in \hbar \xi_{12_i} U_j[a_1] U_k[x_{12}] + 2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \lambda \hbar \xi_{12_i} \xi_{13_i} U_j[x_{13}] U_k[x_{12}] - \\
& 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} U_j[x_{23}] U_k[x_{12}] + \\
& \left(e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \xi_{13_i} + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \lambda \xi_{12_i} \xi_{23_i} + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} \right) U_j[] U_k[x_{13}] + \\
& \left(2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \hbar \xi_{13_i} + 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \lambda \hbar \xi_{12_i} \xi_{23_i} \right) U_j[a_1] U_k[x_{13}] + \\
& \left(2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \hbar \xi_{13_i} + 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \lambda \hbar \xi_{12_i} \xi_{23_i} \right) U_j[a_2] U_k[x_{13}] + \\
& 2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \lambda \hbar \xi_{12_i} \xi_{13_i} U_j[x_{12}] U_k[x_{13}] + \\
& 4 e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda^2 \hbar \xi_{12_i} \xi_{13_i} \xi_{23_i} U_j[x_{13}] U_k[x_{13}] + 2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \lambda \hbar \xi_{13_i} \xi_{23_i} U_j[x_{23}] U_k[x_{13}] + \\
& e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} \xi_{23_i} U_j[] U_k[x_{23}] + 2 e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} \in \hbar \xi_{23_i} U_j[a_2] U_k[x_{23}] + \\
& \left(4 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \hbar \xi_{13_i} + 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} \right) U_j[x_{12}] U_k[x_{23}] + \\
& 2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \lambda \hbar \xi_{13_i} \xi_{23_i} U_j[x_{13}] U_k[x_{23}] + 2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \lambda \hbar \xi_{12_i} \xi_{13_i} U_j[] U_k[x_{12}, x_{13}] - \\
& 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} U_j[] U_k[x_{12}, x_{23}] + \\
& 2 e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda^2 \hbar \xi_{12_i} \xi_{13_i} \xi_{23_i} U_j[] U_k[x_{13}, x_{13}] + 2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \lambda \hbar \xi_{13_i} \xi_{23_i} U_j[] U_k[x_{13}, x_{23}]
\end{aligned}$$

```

In[*]:= mons[-1] = {};
mons[p_] :=
  mons[p - 1]  $\cup$  Union@Cases[Coefficient[TTL,  $\epsilon$ , p],  $c\_.$  Uj[x___] Uk[y___]  $\Rightarrow$  Uj[x] Uk[y],  $\infty$ ];
mons /@ {0, 1}

Out[*]=
{ {Uj[x12] Uk[], Uj[x13] Uk[], Uj[x23] Uk[], Uj[] Uk[x12], Uj[] Uk[x13], Uj[] Uk[x23] },
  {Uj[x12] Uk[], Uj[x13] Uk[], Uj[x23] Uk[], Uj[x12, x13] Uk[], Uj[x12, x23] Uk[],
    Uj[x13, x13] Uk[], Uj[x13, x23] Uk[], Uj[x12] Uk[a1], Uj[x13] Uk[a1], Uj[x13] Uk[a2],
    Uj[x23] Uk[a2], Uj[] Uk[x12], Uj[a1] Uk[x12], Uj[x13] Uk[x12], Uj[x23] Uk[x12],
    Uj[] Uk[x13], Uj[a1] Uk[x13], Uj[a2] Uk[x13], Uj[x12] Uk[x13], Uj[x13] Uk[x13],
    Uj[x23] Uk[x13], Uj[] Uk[x23], Uj[a2] Uk[x23], Uj[x12] Uk[x23], Uj[x13] Uk[x23],
    Uj[] Uk[x12, x13], Uj[] Uk[x12, x23], Uj[] Uk[x13, x13], Uj[] Uk[x13, x23] } }

In[*]:= Uj[x13] Uk[x12] //  $\mathbb{P}_{j,k}$ 

Out[*]=
x12k x13j

In[*]:= ff

Out[*]=
ff

In[*]:= ffj = Table[
  Sum[ $\epsilon^p$  fp,uj[ $\lambda$ ], {p, 0, $k}],
  {u, $PBWgens}
] /. fp,uj[ $\lambda$ ] /;  $\tau[u] == "a" \Rightarrow$  If[p == 0, ( $u^*$ )i, 0]

Out[*]=
{f0,x12j[ $\lambda$ ] +  $\epsilon$  f1,x12j[ $\lambda$ ], f0,x13j[ $\lambda$ ] +  $\epsilon$  f1,x13j[ $\lambda$ ], f0,x23j[ $\lambda$ ] +  $\epsilon$  f1,x23j[ $\lambda$ ],  $\alpha_{1i}$ ,  $\alpha_{2i}$ }

In[*]:= ffk = ffj /. j  $\rightarrow$  k

Out[*]=
{f0,x12k[ $\lambda$ ] +  $\epsilon$  f1,x12k[ $\lambda$ ], f0,x13k[ $\lambda$ ] +  $\epsilon$  f1,x13k[ $\lambda$ ], f0,x23k[ $\lambda$ ] +  $\epsilon$  f1,x23k[ $\lambda$ ],  $\alpha_{1i}$ ,  $\alpha_{2i}$ }

In[*]:= fs = Flatten[Table[
  fp, $\mathbb{P}_{j,k}$ [m],
  {p, 0, $k}, {m, mons[p]}
]]

Out[*]=
{f0,x12j, f0,x13j, f0,x23j, f0,x12k, f0,x13k, f0,x23k, f1,x12j, f1,x13j, f1,x23j, f1,x12j x13j,
  f1,x12j x23j, f1,x13j2, f1,x13j x23j, f1,a1k x12j, f1,a1k x13j, f1,a2k x13j, f1,a2k x23j, f1,x12k, f1,a1j x12k,
  f1,x12k x13j, f1,x12k x23j, f1,x13k, f1,a1j x13k, f1,a2j x13k, f1,x12j x13k, f1,x13j x13k, f1,x13k x23j,
  f1,x23k, f1,a2j x23k, f1,x12j x23k, f1,x13j x23k, f1,x12k x13k, f1,x12k x23k, f1,x13k2, f1,x13k x23k}

In[*]:= gg

Out[*]=
gg

```

In[*]:= **Complement**[**mons**[1], $U_j[] (U_k /@ \$PBWGens) \cup U_k[] (U_j /@ \$PBWGens)$]

Out[*]=

{ $U_j[x_{12}, x_{13}] U_k[], U_j[x_{12}, x_{23}] U_k[], U_j[x_{13}, x_{13}] U_k[], U_j[x_{13}, x_{23}] U_k[],$
 $U_j[x_{12}] U_k[a_1], U_j[x_{13}] U_k[a_1], U_j[x_{13}] U_k[a_2], U_j[x_{23}] U_k[a_2], U_j[a_1] U_k[x_{12}],$
 $U_j[x_{13}] U_k[x_{12}], U_j[x_{23}] U_k[x_{12}], U_j[a_1] U_k[x_{13}], U_j[a_2] U_k[x_{13}], U_j[x_{12}] U_k[x_{13}],$
 $U_j[x_{13}] U_k[x_{13}], U_j[x_{23}] U_k[x_{13}], U_j[a_2] U_k[x_{23}], U_j[x_{12}] U_k[x_{23}], U_j[x_{13}] U_k[x_{23}],$
 $U_j[] U_k[x_{12}, x_{13}], U_j[] U_k[x_{12}, x_{23}], U_j[] U_k[x_{13}, x_{13}], U_j[] U_k[x_{13}, x_{23}] }$

In[*]:= **gg** = **Sum**[
 $\epsilon^p f_{p, \mathbb{P}_{j,k}[u]}[\lambda] \mathbb{P}_{j,k}[u],$
 $\{p, \theta, \$k\}, \{u, \text{Complement}[\text{mons}[p], U_j[] (U_k /@ \$PBWGens) \cup U_k[] (U_j /@ \$PBWGens)]\}$
 $]$

Out[*]=

$\in a_{1k} x_{12j} f_{1, a_{1k} x_{12j}}[\lambda] + \in a_{1j} x_{12k} f_{1, a_{1j} x_{12k}}[\lambda] + \in a_{1k} x_{13j} f_{1, a_{1k} x_{13j}}[\lambda] +$
 $\in a_{2k} x_{13j} f_{1, a_{2k} x_{13j}}[\lambda] + \in x_{12j} x_{13j} f_{1, x_{12j} x_{13j}}[\lambda] + \in x_{12k} x_{13j} f_{1, x_{12k} x_{13j}}[\lambda] +$
 $\in x_{13j}^2 f_{1, x_{13j}^2}[\lambda] + \in a_{1j} x_{13k} f_{1, a_{1j} x_{13k}}[\lambda] + \in a_{2j} x_{13k} f_{1, a_{2j} x_{13k}}[\lambda] + \in x_{12j} x_{13k} f_{1, x_{12j} x_{13k}}[\lambda] +$
 $\in x_{12k} x_{13k} f_{1, x_{12k} x_{13k}}[\lambda] + \in x_{13j} x_{13k} f_{1, x_{13j} x_{13k}}[\lambda] + \in x_{13k}^2 f_{1, x_{13k}^2}[\lambda] + \in a_{2k} x_{23j} f_{1, a_{2k} x_{23j}}[\lambda] +$
 $\in x_{12j} x_{23j} f_{1, x_{12j} x_{23j}}[\lambda] + \in x_{12k} x_{23j} f_{1, x_{12k} x_{23j}}[\lambda] + \in x_{13j} x_{23j} f_{1, x_{13j} x_{23j}}[\lambda] +$
 $\in x_{13k} x_{23j} f_{1, x_{13k} x_{23j}}[\lambda] + \in a_{2j} x_{23k} f_{1, a_{2j} x_{23k}}[\lambda] + \in x_{12j} x_{23k} f_{1, x_{12j} x_{23k}}[\lambda] +$
 $\in x_{12k} x_{23k} f_{1, x_{12k} x_{23k}}[\lambda] + \in x_{13j} x_{23k} f_{1, x_{13j} x_{23k}}[\lambda] + \in x_{13k} x_{23k} f_{1, x_{13k} x_{23k}}[\lambda]$

In[*]:= **G** = **Series**[$e^{gg}, \{\epsilon, \theta, \$k\}]$

Out[*]=

$1 + (a_{1k} x_{12j} f_{1, a_{1k} x_{12j}}[\lambda] + a_{1j} x_{12k} f_{1, a_{1j} x_{12k}}[\lambda] + a_{1k} x_{13j} f_{1, a_{1k} x_{13j}}[\lambda] + a_{2k} x_{13j} f_{1, a_{2k} x_{13j}}[\lambda] +$
 $x_{12j} x_{13j} f_{1, x_{12j} x_{13j}}[\lambda] + x_{12k} x_{13j} f_{1, x_{12k} x_{13j}}[\lambda] + x_{13j}^2 f_{1, x_{13j}^2}[\lambda] + a_{1j} x_{13k} f_{1, a_{1j} x_{13k}}[\lambda] +$
 $a_{2j} x_{13k} f_{1, a_{2j} x_{13k}}[\lambda] + x_{12j} x_{13k} f_{1, x_{12j} x_{13k}}[\lambda] + x_{12k} x_{13k} f_{1, x_{12k} x_{13k}}[\lambda] + x_{13j} x_{13k} f_{1, x_{13j} x_{13k}}[\lambda] +$
 $x_{13k}^2 f_{1, x_{13k}^2}[\lambda] + a_{2k} x_{23j} f_{1, a_{2k} x_{23j}}[\lambda] + x_{12j} x_{23j} f_{1, x_{12j} x_{23j}}[\lambda] + x_{12k} x_{23j} f_{1, x_{12k} x_{23j}}[\lambda] +$
 $x_{13j} x_{23j} f_{1, x_{13j} x_{23j}}[\lambda] + x_{13k} x_{23j} f_{1, x_{13k} x_{23j}}[\lambda] + a_{2j} x_{23k} f_{1, a_{2j} x_{23k}}[\lambda] + x_{12j} x_{23k} f_{1, x_{12j} x_{23k}}[\lambda] +$
 $x_{12k} x_{23k} f_{1, x_{12k} x_{23k}}[\lambda] + x_{13j} x_{23k} f_{1, x_{13j} x_{23k}}[\lambda] + x_{13k} x_{23k} f_{1, x_{13k} x_{23k}}[\lambda]) \in + O[\epsilon]^2$

In[*]:= **S**[**B_**] := **UCF**[**SS**@ $O_{j,k}$ [**Seepage** $_{j,k}$ [**ffj**, **ffk**, **SS**@**UCF**@**B**]]];

In[*]:= **SG** = **ES** ["SG"] @ **PP**^{"SG"} @ **S** [**G**]

$$\gg \text{SG } U_j[] U_k[] + \langle\langle 1 \rangle\rangle + \langle\langle 20 \rangle\rangle + \langle\langle 1 \rangle\rangle + \\ U_j[] U_k[x_{13}, x_{23}] \left(e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{23}}[\lambda] + e^{-\frac{\langle\langle 1 \rangle\rangle}{2}} \in f_{1, \langle\langle 1 \rangle\rangle} \langle\langle 1 \rangle\rangle[\lambda] \right)$$

Out[*]=

$$U_j[] U_k[] + e^{-\frac{1}{2}\gamma(2\alpha_1 - \alpha_2)} \in U_j[x_{12}] U_k[a_1] f_{1, a_1 x_{12}}[\lambda] + e^{-\frac{1}{2}\gamma(2\alpha_1 - \alpha_2)} \in U_j[a_1] U_k[x_{12}] f_{1, a_1 x_{12}}[\lambda] + \\ U_j[x_{13}] U_k[a_1] \left(e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in f_{\emptyset, x_{23}}[\lambda] f_{1, a_1 x_{12}}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in f_{1, a_1 x_{13}}[\lambda] \right) + \\ e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in U_j[x_{13}] U_k[a_2] f_{1, a_2 x_{13}}[\lambda] + \\ e^{-\frac{3\gamma\alpha_1}{2}} \in U_j[x_{12}, x_{13}] U_k[] f_{1, x_{12} x_{13}}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in U_j[x_{13}] U_k[x_{12}] f_{1, x_{12} x_{13}}[\lambda] + \\ U_j[x_{13}, x_{13}] U_k[] \left(e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{13}}[\lambda] + e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{13}^2}[\lambda] \right) + \\ U_j[a_1] U_k[x_{13}] \left(e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in f_{\emptyset, x_{23}}[\lambda] f_{1, a_1 x_{12}}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in f_{1, a_1 x_{13}}[\lambda] \right) + \\ e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in U_j[a_2] U_k[x_{13}] f_{1, a_2 x_{13}}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in U_j[x_{12}] U_k[x_{13}] f_{1, x_{12} x_{13}}[\lambda] + \\ e^{-\frac{3\gamma\alpha_1}{2}} \in U_j[] U_k[x_{12}, x_{13}] f_{1, x_{12} x_{13}}[\lambda] + U_j[x_{13}] U_k[x_{13}] \left(e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{13}}[\lambda] + \right. \\ \left. e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{13}}[\lambda] + e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{13} x_{13}}[\lambda] \right) + \\ U_j[] U_k[x_{13}, x_{13}] \left(e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{13}}[\lambda] + e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{13}^2}[\lambda] \right) + \\ e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \in U_j[x_{23}] U_k[a_2] f_{1, a_2 x_{23}}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in U_j[x_{12}, x_{23}] U_k[] f_{1, x_{12} x_{23}}[\lambda] + \\ e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in U_j[x_{23}] U_k[x_{12}] f_{1, x_{12} x_{23}}[\lambda] + \\ U_j[x_{13}, x_{23}] U_k[] \left(e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{23}}[\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1, x_{13} x_{23}}[\lambda] \right) + \\ U_j[x_{23}] U_k[x_{13}] \left(e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{23}}[\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1, x_{13} x_{23}}[\lambda] \right) + \\ e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \in U_j[a_2] U_k[x_{23}] f_{1, a_2 x_{23}}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in U_j[x_{12}] U_k[x_{23}] f_{1, x_{12} x_{23}}[\lambda] + \\ e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in U_j[] U_k[x_{12}, x_{23}] f_{1, x_{12} x_{23}}[\lambda] + \\ U_j[x_{13}] U_k[x_{23}] \left(e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{23}}[\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1, x_{13} x_{23}}[\lambda] \right) + \\ U_j[] U_k[x_{13}, x_{23}] \left(e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\emptyset, x_{23}}[\lambda] f_{1, x_{12} x_{23}}[\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1, x_{13} x_{23}}[\lambda] \right)$$

In[*]:= **TTR** = **ES** ["TTR"] @

PP^{"TTR"} @ **UCF** [**Invert**_{j,k} [**SG**] $\boxtimes$ **S** [(∂_λ (**ffj**. ($\#_j$ & /@ **\$PBWGens**) + **ffk**. ($\#_k$ & /@ **\$PBWGens**)) **G** + ∂_λ **G**]]

$\gg$ **TTR** $\langle\langle 1 \rangle\rangle$

Out[*]=

$$U_j[x_{12}] U_k[x_{12}] \left(-e^{-\gamma(2\alpha_1 - \alpha_2)} \gamma \in f_{1, a_1 x_{12}}[\lambda] f_{\emptyset, x_{12}}'[\lambda] - e^{-\gamma(2\alpha_1 - \alpha_2)} \gamma \in f_{1, a_1 x_{12}}[\lambda] f_{\emptyset, x_{12}}'[\lambda] \right) + \\ U_j[x_{23}] U_k[x_{23}] \left(-e^{-\gamma(\alpha_1 - 2\alpha_2)} \gamma \in f_{1, a_2 x_{23}}[\lambda] f_{\emptyset, x_{23}}'[\lambda] - e^{-\gamma(\alpha_1 - 2\alpha_2)} \gamma \in f_{1, a_2 x_{23}}[\lambda] f_{\emptyset, x_{23}}'[\lambda] \right) + \\ U_j[x_{12}] U_k[] \left(e^{-\frac{1}{2}\gamma(2\alpha_1 - \alpha_2)} f_{\emptyset, x_{12}}'[\lambda] + e^{-\frac{1}{2}\gamma(2\alpha_1 - \alpha_2)} \in f_{1, x_{12}}'[\lambda] \right) + \\ e^{-\frac{1}{2}\gamma(2\alpha_1 - \alpha_2)} \in U_j[x_{12}] U_k[a_1] f_{1, a_1 x_{12}}'[\lambda] + \\ U_j[] U_k[x_{12}] \left(e^{-\frac{1}{2}\gamma(2\alpha_1 - \alpha_2)} f_{\emptyset, x_{12}}'[\lambda] + e^{-\frac{1}{2}\gamma(2\alpha_1 - \alpha_2)} \in f_{1, x_{12}}'[\lambda] \right) + \\ e^{-\frac{1}{2}\gamma(2\alpha_1 - \alpha_2)} \in U_j[a_1] U_k[x_{12}] f_{1, a_1 x_{12}}'[\lambda] + \\ U_j[x_{13}] U_k[] \left(e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} f_{\emptyset, x_{23}}[\lambda] f_{\emptyset, x_{12}}'[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in f_{\emptyset, x_{23}}[\lambda] f_{\emptyset, x_{12}}'[\lambda] + \right.$$

$$\begin{aligned}
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\theta,x13_j'}[\lambda] + \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x23_j}[\lambda] f_{1,x12_j'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,x13_j'}[\lambda] \Big) + \\
& U_j[x13] U_k[a1] \Big(e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x23_j}[\lambda] f_{1,a1_k x12_j'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a1_k x13_j'}[\lambda] \Big) + \\
& U_j[x13] U_k[a2] \Big(e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a2_k x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a2_k x13_j'}[\lambda] \Big) + \\
& U_j[x12, x13] U_k[] \\
& \Big(2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \hbar f_{\theta,x13_j}[\lambda] f_{\theta,x12_j'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x12_j x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x12_j x13_j'}[\lambda] \Big) + \\
& U_j[x13] U_k[x12] \Big(-\frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{\theta,x23_j}[\lambda] f_{1,a1_j x12_k}[\lambda] f_{\theta,x12_j'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x12_k x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] - \\
& e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{\theta,x23_j}[\lambda] f_{1,a1_k x12_j}[\lambda] f_{\theta,x12_k'}[\lambda] - e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{1,a1_k x13_j}[\lambda] f_{\theta,x12_k'}[\lambda] + \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \\
& \in f_{1,a2_k x13_j}[\lambda] f_{\theta,x12_k'}[\lambda] - \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{1,a1_j x12_k}[\lambda] f_{\theta,x13_j'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x12_k x13_j'}[\lambda] \Big) + \\
& U_j[x13, x13] U_k[] \Big(2 e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in \hbar f_{\theta,x13_j}[\lambda] f_{\theta,x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] + \\
& e^{-\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x23_j}[\lambda] f_{1,x12_j x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] + e^{-\gamma(\alpha_1+\alpha_2)} \in f_{1,x13_j x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] + \\
& e^{-\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x23_j}[\lambda] f_{1,x12_j x13_j'}[\lambda] + e^{-\gamma(\alpha_1+\alpha_2)} \in f_{1,x13_j'}[\lambda] \Big) + \\
& U_j[] U_k[x13] \Big(e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\theta,x23_k}[\lambda] f_{\theta,x12_k'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \hbar f_{\theta,x23_k}[\lambda] f_{\theta,x12_k'}[\lambda] + \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,x23_k}[\lambda] f_{\theta,x12_k'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\theta,x13_k'}[\lambda] + \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x23_k}[\lambda] f_{1,x12_k'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,x13_k'}[\lambda] \Big) + \\
& U_j[a1] U_k[x13] \Big(e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x23_k}[\lambda] f_{1,a1_j x12_k'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a1_j x13_k'}[\lambda] \Big) + \\
& U_j[a2] U_k[x13] \Big(e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a2_j x23_k}[\lambda] f_{\theta,x12_k'}[\lambda] + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a2_j x13_k'}[\lambda] \Big) + \\
& U_j[x12] U_k[x13] \Big(-e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{\theta,x23_k}[\lambda] f_{1,a1_j x12_k}[\lambda] f_{\theta,x12_j'}[\lambda] - \\
& e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{1,a1_j x13_k}[\lambda] f_{\theta,x12_j'}[\lambda] + \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{1,a2_j x13_k}[\lambda] f_{\theta,x12_j'}[\lambda] - \\
& \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{\theta,x23_k}[\lambda] f_{1,a1_k x12_j}[\lambda] f_{\theta,x12_k'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x12_j x23_k}[\lambda] f_{\theta,x12_k'}[\lambda] - \\
& \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{1,a1_k x12_j}[\lambda] f_{\theta,x13_k'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x12_j x13_k'}[\lambda] \Big) + U_j[] U_k[x12, x13] \\
& \Big(2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \hbar f_{\theta,x13_k}[\lambda] f_{\theta,x12_k'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x12_k x23_k}[\lambda] f_{\theta,x12_k'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x12_k x13_k'}[\lambda] \Big) + \\
& U_j[x13] U_k[x13] \Big(-\frac{1}{2} e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in f_{\theta,x23_j}[\lambda] f_{\theta,x23_k}[\lambda] f_{1,a1_j x12_k}[\lambda] f_{\theta,x12_j'}[\lambda] - \frac{1}{2} e^{-\gamma(\alpha_1+\alpha_2)} \\
& \gamma \in f_{\theta,x23_j}[\lambda] f_{1,a1_j x13_k}[\lambda] f_{\theta,x12_j'}[\lambda] - \frac{1}{2} e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in f_{\theta,x23_j}[\lambda] f_{1,a2_j x13_k}[\lambda] f_{\theta,x12_j'}[\lambda] + \\
& e^{-\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x23_k}[\lambda] f_{1,x12_k x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] + e^{-\gamma(\alpha_1+\alpha_2)} \in f_{1,x13_k x23_j}[\lambda] f_{\theta,x12_j'}[\lambda] - \\
& \frac{1}{2} e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in f_{\theta,x23_j}[\lambda] f_{\theta,x23_k}[\lambda] f_{1,a1_k x12_j}[\lambda] f_{\theta,x12_k'}[\lambda] - \frac{1}{2} e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in
\end{aligned}$$

$$\begin{aligned}
& f_{\theta, x_{23_k}}[\lambda] f_{1, a_{1_k} x_{13_j}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] - \frac{1}{2} e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{\theta, x_{23_k}}[\lambda] f_{1, a_{2_k} x_{13_j}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] + \\
& e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{\theta, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] + e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{1, x_{13_j} x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] - \\
& \frac{1}{2} e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{\theta, x_{23_k}}[\lambda] f_{1, a_{1_j} x_{12_k}}[\lambda] f_{\theta, x_{13_j}}'[\lambda] - \frac{1}{2} e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{1, a_{1_j} x_{13_k}}[\lambda] f_{\theta, x_{13_j}}'[\lambda] - \\
& \frac{1}{2} e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{1, a_{2_j} x_{13_k}}[\lambda] f_{\theta, x_{13_j}}'[\lambda] - \frac{1}{2} e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{\theta, x_{23_j}}[\lambda] f_{1, a_{1_k} x_{12_j}}[\lambda] f_{\theta, x_{13_k}}'[\lambda] - \\
& \frac{1}{2} e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{1, a_{1_k} x_{13_j}}[\lambda] f_{\theta, x_{13_k}}'[\lambda] - \frac{1}{2} e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{1, a_{2_k} x_{13_j}}[\lambda] f_{\theta, x_{13_k}}'[\lambda] + e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in \\
& f_{\theta, x_{23_k}}[\lambda] f_{1, x_{12_k} x_{13_j}}'[\lambda] + e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{\theta, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{13_k}}'[\lambda] + e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{1, x_{13_j} x_{13_k}}'[\lambda] \Big) + \\
& U_j[] U_k[x_{13}, x_{13}] \left(2 e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in \hbar f_{\theta, x_{13_k}}[\lambda] f_{\theta, x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] + \right. \\
& e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{\theta, x_{23_k}}[\lambda] f_{1, x_{12_k} x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] + e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{1, x_{13_k} x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] + \\
& \left. e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{\theta, x_{23_k}}[\lambda] f_{1, x_{12_k} x_{13_k}}'[\lambda] + e^{-\gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{1, x_{13_k}'}[\lambda] \right) + \\
& U_j[x_{23}] U_k[] \left(e^{\frac{1}{2} \gamma(\alpha_{1_i} - 2 \alpha_{2_i})} f_{\theta, x_{23_j}}'[\lambda] + e^{\frac{1}{2} \gamma(\alpha_{1_i} - 2 \alpha_{2_i})} \in f_{1, x_{23_j}}'[\lambda] \right) + \\
& e^{\frac{1}{2} \gamma(\alpha_{1_i} - 2 \alpha_{2_i})} \in U_j[x_{23}] U_k[a_2] f_{1, a_{2_k} x_{23_j}}'[\lambda] + \\
& U_j[x_{12}, x_{23}] U_k[] \left(-2 e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in \hbar f_{\theta, x_{23_j}}[\lambda] f_{\theta, x_{12_j}}'[\lambda] + e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{1, x_{12_j} x_{23_j}}'[\lambda] \right) + \\
& U_j[x_{23}] U_k[x_{12}] \left(\frac{1}{2} e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{1, a_{2_k} x_{23_j}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] + \right. \\
& \left. \frac{1}{2} e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{1, a_{1_j} x_{12_k}}[\lambda] f_{\theta, x_{23_j}}'[\lambda] + e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{1, x_{12_k} x_{23_j}}'[\lambda] \right) + U_j[x_{13}, x_{23}] U_k[] \\
& \left(2 e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \gamma \in \hbar f_{\theta, x_{23_j}}[\lambda] f_{\theta, x_{13_j}}'[\lambda] + e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \in f_{\theta, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{23_j}}'[\lambda] + e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \in f_{1, x_{13_j} x_{23_j}}'[\lambda] \right) + \\
& U_j[x_{23}] U_k[x_{13}] \left(-\frac{1}{2} e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \gamma \in f_{\theta, x_{23_k}}[\lambda] f_{1, a_{2_k} x_{23_j}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] - \right. \\
& \frac{1}{2} e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \gamma \in f_{1, a_{2_k} x_{23_j}}[\lambda] f_{\theta, x_{13_k}}'[\lambda] + \frac{1}{2} e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \gamma \in f_{\theta, x_{23_k}}[\lambda] f_{1, a_{1_j} x_{12_k}}[\lambda] f_{\theta, x_{23_j}}'[\lambda] + \\
& \frac{1}{2} e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \gamma \in f_{1, a_{1_j} x_{13_k}}[\lambda] f_{\theta, x_{23_j}}'[\lambda] - e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \gamma \in f_{1, a_{2_j} x_{13_k}}[\lambda] f_{\theta, x_{23_j}}'[\lambda] + \\
& \left. e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \in f_{\theta, x_{23_k}}[\lambda] f_{1, x_{12_k} x_{23_j}}'[\lambda] + e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \in f_{1, x_{13_k} x_{23_j}}'[\lambda] \right) + \\
& U_j[] U_k[x_{23}] \left(e^{\frac{1}{2} \gamma(\alpha_{1_i} - 2 \alpha_{2_i})} f_{\theta, x_{23_k}}'[\lambda] + e^{\frac{1}{2} \gamma(\alpha_{1_i} - 2 \alpha_{2_i})} \in f_{1, x_{23_k}}'[\lambda] \right) + \\
& e^{\frac{1}{2} \gamma(\alpha_{1_i} - 2 \alpha_{2_i})} \in U_j[a_2] U_k[x_{23}] f_{1, a_{2_j} x_{23_k}}'[\lambda] + \\
& U_j[x_{12}] U_k[x_{23}] \left(\frac{1}{2} e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{1, a_{2_j} x_{23_k}}[\lambda] f_{\theta, x_{12_j}}'[\lambda] + \right. \\
& \left. \frac{1}{2} e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in f_{1, a_{1_k} x_{12_j}}[\lambda] f_{\theta, x_{23_k}}'[\lambda] + e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{1, x_{12_j} x_{23_k}}'[\lambda] \right) + \\
& U_j[] U_k[x_{12}, x_{23}] \left(-2 e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \gamma \in \hbar f_{\theta, x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] + e^{-\frac{1}{2} \gamma(\alpha_{1_i} + \alpha_{2_i})} \in f_{1, x_{12_k} x_{23_k}}'[\lambda] \right) + \\
& U_j[x_{13}] U_k[x_{23}] \left(-\frac{1}{2} e^{-\frac{3 \gamma \alpha_{2_i}}{2}} \gamma \in f_{\theta, x_{23_j}}[\lambda] f_{1, a_{2_j} x_{23_k}}[\lambda] f_{\theta, x_{12_j}}'[\lambda] - \right.
\end{aligned}$$

$$\begin{aligned} & \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1,a_2j} x_{23k} [\lambda] f_{\theta,x_{13j}}' [\lambda] + \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{\theta,x_{23j}} [\lambda] f_{1,a_{1k}x_{12j}} [\lambda] f_{\theta,x_{23k}}' [\lambda] + \\ & \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1,a_{1k}x_{13j}} [\lambda] f_{\theta,x_{23k}}' [\lambda] - e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1,a_{2k}x_{13j}} [\lambda] f_{\theta,x_{23k}}' [\lambda] + \\ & e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\theta,x_{23j}} [\lambda] f_{1,x_{12j}x_{23k}}' [\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1,x_{13j}x_{23k}}' [\lambda] \Big) + U_j [] U_k [x_{13}, x_{23}] \\ & \left(2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \hbar f_{\theta,x_{23k}} [\lambda] f_{\theta,x_{13k}}' [\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\theta,x_{23k}} [\lambda] f_{1,x_{12k}x_{23k}}' [\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1,x_{13k}x_{23k}}' [\lambda] \right) \end{aligned}$$

In[*]:= **diff = UCF [TTL - TTR]**

Out[*]=

$$\begin{aligned} & U_j [x_{12}] U_k [x_{12}] \left(e^{-\gamma(2\alpha_1-\alpha_2)} \gamma \in f_{1,a_{1j}x_{12k}} [\lambda] f_{\theta,x_{12j}}' [\lambda] + e^{-\gamma(2\alpha_1-\alpha_2)} \gamma \in f_{1,a_{1k}x_{12j}} [\lambda] f_{\theta,x_{12k}}' [\lambda] \right) + \\ & U_j [x_{23}] U_k [x_{23}] \left(e^{\gamma(\alpha_1-2\alpha_2)} \gamma \in f_{1,a_{2j}x_{23k}} [\lambda] f_{\theta,x_{23j}}' [\lambda] + e^{\gamma(\alpha_1-2\alpha_2)} \gamma \in f_{1,a_{2k}x_{23j}} [\lambda] f_{\theta,x_{23k}}' [\lambda] \right) + \\ & U_j [x_{12}] U_k [] \left(e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \xi_{12i} - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} f_{\theta,x_{12j}}' [\lambda] - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \in f_{1,x_{12j}}' [\lambda] \right) + \\ & U_j [x_{12}] U_k [a_1] \left(-2 e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \in \hbar \xi_{12i} - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \in f_{1,a_{1k}x_{12j}}' [\lambda] \right) + \\ & U_j [] U_k [x_{12}] \left(e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \xi_{12i} - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} f_{\theta,x_{12k}}' [\lambda] - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \in f_{1,x_{12k}}' [\lambda] \right) + \\ & U_j [a_1] U_k [x_{12}] \left(2 e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \in \hbar \xi_{12i} - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \in f_{1,a_{1j}x_{12k}}' [\lambda] \right) + U_j [x_{13}] U_k [] \\ & \left(e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \xi_{13i} + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \lambda \xi_{12i} \xi_{23i} + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda \hbar \xi_{12i} \xi_{23i} - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\theta,x_{23j}} [\lambda] \right. \\ & f_{\theta,x_{12j}}' [\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \in \hbar f_{\theta,x_{23j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,x_{23j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - \\ & e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\theta,x_{13j}}' [\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x_{23j}} [\lambda] f_{1,x_{12j}}' [\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,x_{13j}}' [\lambda] \Big) + \\ & U_j [x_{13}] U_k [a_1] \left(-2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \hbar \xi_{13i} - 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \lambda \hbar \xi_{12i} \xi_{23i} - \right. \\ & e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x_{23j}} [\lambda] f_{1,a_{1k}x_{12j}}' [\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a_{1k}x_{13j}}' [\lambda] \Big) + \\ & U_j [x_{13}] U_k [a_2] \left(-2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \hbar \xi_{13i} - 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in \lambda \hbar \xi_{12i} \xi_{23i} - \right. \\ & e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a_{2k}x_{23j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \in f_{1,a_{2k}x_{13j}}' [\lambda] \Big) + \\ & U_j [x_{12}, x_{13}] U_k [] \left(2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \lambda \hbar \xi_{12i} \xi_{13i} - 2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \hbar f_{\theta,x_{13j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - \right. \\ & e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x_{12j}x_{23j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x_{12j}x_{13j}}' [\lambda] \Big) + \\ & U_j [x_{13}] U_k [x_{12}] \left(2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in \lambda \hbar \xi_{12i} \xi_{13i} + \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{\theta,x_{23j}} [\lambda] f_{1,a_{1j}x_{12k}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - \right. \\ & e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x_{12k}x_{23j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{\theta,x_{23j}} [\lambda] f_{1,a_{1k}x_{12j}} [\lambda] f_{\theta,x_{12k}}' [\lambda] + \\ & e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{1,a_{1k}x_{13j}} [\lambda] f_{\theta,x_{12k}}' [\lambda] - \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{1,a_{2k}x_{13j}} [\lambda] f_{\theta,x_{12k}}' [\lambda] + \\ & \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma \in f_{1,a_{1j}x_{12k}} [\lambda] f_{\theta,x_{13j}}' [\lambda] - e^{-\frac{3\gamma\alpha_1}{2}} \in f_{1,x_{12k}x_{13j}}' [\lambda] \Big) + U_j [x_{13}, x_{13}] U_k [] \\ & \left(2 e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in \lambda^2 \hbar \xi_{12i} \xi_{13i} \xi_{23i} - 2 e^{-\gamma(\alpha_1+\alpha_2)} \gamma \in \hbar f_{\theta,x_{13j}} [\lambda] f_{\theta,x_{23j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - \right. \\ & e^{-\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x_{23j}} [\lambda] f_{1,x_{12j}x_{23j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - e^{-\gamma(\alpha_1+\alpha_2)} \in f_{1,x_{13j}x_{23j}} [\lambda] f_{\theta,x_{12j}}' [\lambda] - \\ & e^{-\gamma(\alpha_1+\alpha_2)} \in f_{\theta,x_{23j}} [\lambda] f_{1,x_{12j}x_{13j}}' [\lambda] - e^{-\gamma(\alpha_1+\alpha_2)} \in f_{1,x_{13j}}' [\lambda] \Big) + \end{aligned}$$

$$\begin{aligned}
& U_j [] U_k [x13] \left(e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \xi13_i + e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \lambda \xi12_i \xi23_i + e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \gamma \in \lambda \hbar \xi12_i \xi23_i - \right. \\
& e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} f_{\theta,x23_k}[\lambda] f_{\theta,x12_k}'[\lambda] - e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \gamma \in \hbar f_{\theta,x23_k}[\lambda] f_{\theta,x12_k}'[\lambda] - \\
& e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in f_{1,x23_k}[\lambda] f_{\theta,x12_k}'[\lambda] - e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} f_{\theta,x13_k}'[\lambda] - \\
& \left. e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in f_{\theta,x23_k}[\lambda] f_{1,x12_k}'[\lambda] - e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in f_{1,x13_k}'[\lambda] \right) + \\
& U_j [a1] U_k [x13] \left(2 e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in \hbar \xi13_i + 2 e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in \lambda \hbar \xi12_i \xi23_i - \right. \\
& \left. e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in f_{\theta,x23_k}[\lambda] f_{1,a1_j x12_k}'[\lambda] - e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in f_{1,a1_j x13_k}'[\lambda] \right) + \\
& U_j [a2] U_k [x13] \left(2 e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in \hbar \xi13_i + 2 e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in \lambda \hbar \xi12_i \xi23_i - \right. \\
& \left. e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in f_{1,a2_j x23_k}[\lambda] f_{\theta,x12_k}'[\lambda] - e^{-\frac{1}{2}\gamma(\alpha1_i+\alpha2_i)} \in f_{1,a2_j x13_k}'[\lambda] \right) + \\
& U_j [x12] U_k [x13] \left(2 e^{-\frac{3\gamma\alpha1_i}{2}} \gamma \in \lambda \hbar \xi12_i \xi13_i + e^{-\frac{3\gamma\alpha1_i}{2}} \gamma \in f_{\theta,x23_k}[\lambda] f_{1,a1_j x12_k}[\lambda] f_{\theta,x12_j}'[\lambda] + \right. \\
& e^{-\frac{3\gamma\alpha1_i}{2}} \gamma \in f_{1,a1_j x13_k}[\lambda] f_{\theta,x12_j}'[\lambda] - \frac{1}{2} e^{-\frac{3\gamma\alpha1_i}{2}} \gamma \in f_{1,a2_j x13_k}[\lambda] f_{\theta,x12_j}'[\lambda] + \\
& \frac{1}{2} e^{-\frac{3\gamma\alpha1_i}{2}} \gamma \in f_{\theta,x23_k}[\lambda] f_{1,a1_k x12_j}[\lambda] f_{\theta,x12_k}'[\lambda] - e^{-\frac{3\gamma\alpha1_i}{2}} \in f_{1,x12_j x23_k}[\lambda] f_{\theta,x12_k}'[\lambda] + \\
& \left. \frac{1}{2} e^{-\frac{3\gamma\alpha1_i}{2}} \gamma \in f_{1,a1_k x12_j}[\lambda] f_{\theta,x13_k}'[\lambda] - e^{-\frac{3\gamma\alpha1_i}{2}} \in f_{1,x12_j x13_k}'[\lambda] \right) + \\
& U_j [] U_k [x12, x13] \left(2 e^{-\frac{3\gamma\alpha1_i}{2}} \gamma \in \lambda \hbar \xi12_i \xi13_i - 2 e^{-\frac{3\gamma\alpha1_i}{2}} \gamma \in \hbar f_{\theta,x13_k}[\lambda] f_{\theta,x12_k}'[\lambda] - \right. \\
& \left. e^{-\frac{3\gamma\alpha1_i}{2}} \in f_{1,x12_k x23_k}[\lambda] f_{\theta,x12_k}'[\lambda] - e^{-\frac{3\gamma\alpha1_i}{2}} \in f_{1,x12_k x13_k}'[\lambda] \right) + \\
& U_j [x13] U_k [x13] \left(4 e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in \lambda^2 \hbar \xi12_i \xi13_i \xi23_i + \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{\theta,x23_j}[\lambda] \right. \\
& f_{\theta,x23_k}[\lambda] f_{1,a1_j x12_k}[\lambda] f_{\theta,x12_j}'[\lambda] + \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{\theta,x23_j}[\lambda] f_{1,a1_j x13_k}[\lambda] f_{\theta,x12_j}'[\lambda] + \\
& \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{\theta,x23_j}[\lambda] f_{1,a2_j x13_k}[\lambda] f_{\theta,x12_j}'[\lambda] - \\
& e^{-\gamma(\alpha1_i+\alpha2_i)} \in f_{\theta,x23_k}[\lambda] f_{1,x12_k x23_j}[\lambda] f_{\theta,x12_j}'[\lambda] - e^{-\gamma(\alpha1_i+\alpha2_i)} \in f_{1,x13_k x23_j}[\lambda] f_{\theta,x12_j}'[\lambda] + \\
& \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{\theta,x23_j}[\lambda] f_{\theta,x23_k}[\lambda] f_{1,a1_k x12_j}[\lambda] f_{\theta,x12_k}'[\lambda] + \\
& \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{\theta,x23_k}[\lambda] f_{1,a1_k x13_j}[\lambda] f_{\theta,x12_k}'[\lambda] + \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{\theta,x23_k}[\lambda] \\
& f_{1,a2_k x13_j}[\lambda] f_{\theta,x12_k}'[\lambda] - e^{-\gamma(\alpha1_i+\alpha2_i)} \in f_{\theta,x23_j}[\lambda] f_{1,x12_j x23_k}[\lambda] f_{\theta,x12_k}'[\lambda] - \\
& e^{-\gamma(\alpha1_i+\alpha2_i)} \in f_{1,x13_j x23_k}[\lambda] f_{\theta,x12_k}'[\lambda] + \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{\theta,x23_k}[\lambda] f_{1,a1_j x12_k}[\lambda] f_{\theta,x13_j}'[\lambda] + \\
& \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{1,a1_j x13_k}[\lambda] f_{\theta,x13_j}'[\lambda] + \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{1,a2_j x13_k}[\lambda] f_{\theta,x13_j}'[\lambda] + \\
& \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{\theta,x23_j}[\lambda] f_{1,a1_k x12_j}[\lambda] f_{\theta,x13_k}'[\lambda] + \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{1,a1_k x13_j}[\lambda] f_{\theta,x13_k}'[\lambda] + \\
& \left. \frac{1}{2} e^{-\gamma(\alpha1_i+\alpha2_i)} \gamma \in f_{1,a2_k x13_j}[\lambda] f_{\theta,x13_k}'[\lambda] - e^{-\gamma(\alpha1_i+\alpha2_i)} \in f_{\theta,x23_k}[\lambda] f_{1,x12_k x13_j}'[\lambda] - \right)
\end{aligned}$$

$$\begin{aligned}
& e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{\theta, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{13_k}}'[\lambda] - e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{13_j} x_{13_k}}'[\lambda] \Big) + U_j[] U_k[x_{13}, x_{13}] \\
& \left(2 e^{-\gamma(\alpha_1 + \alpha_2)} \gamma \in \hbar \xi_{12_i} \xi_{13_i} \xi_{23_i} - 2 e^{-\gamma(\alpha_1 + \alpha_2)} \gamma \in \hbar f_{\theta, x_{13_k}}[\lambda] f_{\theta, x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] - \right. \\
& e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{\theta, x_{23_k}}[\lambda] f_{1, x_{12_k} x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] - e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{13_k} x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] - \\
& e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{\theta, x_{23_k}}[\lambda] f_{1, x_{12_k} x_{13_k}}'[\lambda] - e^{-\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{13_k}}'[\lambda] \Big) + \\
& U_j[x_{23}] U_k[] \left(e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \xi_{23_i} - e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} f_{\theta, x_{23_j}}'[\lambda] - e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \in f_{1, x_{23_j}}'[\lambda] \right) + \\
& U_j[x_{23}] U_k[a_2] \left(-2 e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \in \hbar \xi_{23_i} - e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \in f_{1, a_{2_k} x_{23_j}}'[\lambda] \right) + \\
& U_j[x_{12}, x_{23}] U_k[] \left(-2 e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} + \right. \\
& 2 e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in \hbar f_{\theta, x_{23_j}}[\lambda] f_{\theta, x_{12_j}}'[\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{12_j} x_{23_j}}'[\lambda] \Big) + \\
& U_j[x_{23}] U_k[x_{12}] \left(-2 e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} - \frac{1}{2} e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in f_{1, a_{2_k} x_{23_j}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] - \right. \\
& \frac{1}{2} e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in f_{1, a_{1_j} x_{12_k}}[\lambda] f_{\theta, x_{23_j}}'[\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{12_k} x_{23_j}}'[\lambda] \Big) + \\
& U_j[x_{13}, x_{23}] U_k[] \left(2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \lambda \hbar \xi_{13_i} \xi_{23_i} - 2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \hbar f_{\theta, x_{23_j}}[\lambda] f_{\theta, x_{13_j}}'[\lambda] - \right. \\
& e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\theta, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{23_j}}'[\lambda] - e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1, x_{13_j} x_{23_j}}'[\lambda] \Big) + \\
& U_j[x_{23}] U_k[x_{13}] \left(2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \lambda \hbar \xi_{13_i} \xi_{23_i} + \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{\theta, x_{23_k}}[\lambda] f_{1, a_{2_k} x_{23_j}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] + \right. \\
& \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1, a_{2_k} x_{23_j}}[\lambda] f_{\theta, x_{13_k}}'[\lambda] - \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{\theta, x_{23_k}}[\lambda] f_{1, a_{1_j} x_{12_k}}[\lambda] f_{\theta, x_{23_j}}'[\lambda] - \\
& \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1, a_{1_j} x_{13_k}}[\lambda] f_{\theta, x_{23_j}}'[\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1, a_{2_j} x_{13_k}}[\lambda] f_{\theta, x_{23_j}}'[\lambda] - \\
& e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\theta, x_{23_k}}[\lambda] f_{1, x_{12_k} x_{23_j}}'[\lambda] - e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1, x_{13_k} x_{23_j}}'[\lambda] \Big) + \\
& U_j[] U_k[x_{23}] \left(e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \xi_{23_i} - e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} f_{\theta, x_{23_k}}'[\lambda] - e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \in f_{1, x_{23_k}}'[\lambda] \right) + \\
& U_j[a_2] U_k[x_{23}] \left(2 e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \in \hbar \xi_{23_i} - e^{\frac{1}{2}\gamma(\alpha_1 - 2\alpha_2)} \in f_{1, a_{2_j} x_{23_k}}'[\lambda] \right) + \\
& U_j[x_{12}] U_k[x_{23}] \\
& \left(4 e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in \hbar \xi_{13_i} + 2 e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} - \frac{1}{2} e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in f_{1, a_{2_j} x_{23_k}}[\lambda] \right. \\
& f_{\theta, x_{12_j}}'[\lambda] - \frac{1}{2} e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in f_{1, a_{1_k} x_{12_j}}[\lambda] f_{\theta, x_{23_k}}'[\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{12_j} x_{23_k}}'[\lambda] \Big) + \\
& U_j[] U_k[x_{12}, x_{23}] \left(-2 e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in \lambda \hbar \xi_{12_i} \xi_{23_i} + 2 e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \gamma \in \hbar f_{\theta, x_{23_k}}[\lambda] f_{\theta, x_{12_k}}'[\lambda] - \right. \\
& e^{-\frac{1}{2}\gamma(\alpha_1 + \alpha_2)} \in f_{1, x_{12_k} x_{23_k}}'[\lambda] \Big) + \\
& U_j[x_{13}] U_k[x_{23}] \left(2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \lambda \hbar \xi_{13_i} \xi_{23_i} + \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{\theta, x_{23_j}}[\lambda] f_{1, a_{2_j} x_{23_k}}[\lambda] f_{\theta, x_{12_j}}'[\lambda] + \right. \\
& \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1, a_{2_j} x_{23_k}}[\lambda] f_{\theta, x_{13_j}}'[\lambda] - \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{\theta, x_{23_j}}[\lambda] f_{1, a_{1_k} x_{12_j}}[\lambda] f_{\theta, x_{23_k}}'[\lambda] - \\
& \frac{1}{2} e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1, a_{1_k} x_{13_j}}[\lambda] f_{\theta, x_{23_k}}'[\lambda] + e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in f_{1, a_{2_k} x_{13_j}}[\lambda] f_{\theta, x_{23_k}}'[\lambda] -
\end{aligned}$$

$$\begin{aligned}
& \left(e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\emptyset, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{23_k}'}[\lambda] - e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1, x_{13_j} x_{23_k}'}[\lambda] \right) + \\
& U_j[] U_k[x_{13}, x_{23}] \left(2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \lambda \hbar \xi_{13_i} \xi_{23_i} - 2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \in \hbar f_{\emptyset, x_{23_k}}[\lambda] f_{\emptyset, x_{13_k}'}[\lambda] - \right. \\
& \left. e^{-\frac{3\gamma\alpha_2}{2}} \in f_{\emptyset, x_{23_k}}[\lambda] f_{1, x_{12_k} x_{23_k}'}[\lambda] - e^{-\frac{3\gamma\alpha_2}{2}} \in f_{1, x_{13_k} x_{23_k}'}[\lambda] \right)
\end{aligned}$$

```

In[*]:= eqns = Flatten[Table[
  Coefficient[Coefficient[diff, m], e, p] == 0,
  {p, 0, $k}, {m, mons[p]}
]]

```

Out[*]=

$$\begin{aligned}
& \left\{ e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \xi_{12_i} - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} f_{\emptyset, x_{12_j}'}[\lambda] = 0, \right. \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \xi_{13_i} + e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \lambda \xi_{12_i} \xi_{23_i} - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\emptyset, x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\emptyset, x_{13_j}'}[\lambda] = 0, e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} \xi_{23_i} - e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} f_{\emptyset, x_{23_j}'}[\lambda] = 0, \\
& e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \xi_{12_i} - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} f_{\emptyset, x_{12_k}'}[\lambda] = 0, e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \xi_{13_i} + \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \lambda \xi_{12_i} \xi_{23_i} - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\emptyset, x_{23_k}}[\lambda] f_{\emptyset, x_{12_k}'}[\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\emptyset, x_{13_k}'}[\lambda] = 0, \\
& e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} \xi_{23_i} - e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} f_{\emptyset, x_{23_k}'}[\lambda] = 0, -e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} f_{1, x_{12_j}'}[\lambda] = 0, \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \lambda \hbar \xi_{12_i} \xi_{23_i} - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \hbar f_{\emptyset, x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{1, x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\emptyset, x_{23_j}}[\lambda] f_{1, x_{12_j}'}[\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{1, x_{13_j}'}[\lambda] = 0, \\
& -e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} f_{1, x_{23_j}'}[\lambda] = 0, 2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \lambda \hbar \xi_{12_i} \xi_{13_i} - 2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \hbar f_{\emptyset, x_{13_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - \\
& e^{-\frac{3\gamma\alpha_1}{2}} f_{1, x_{12_j} x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - e^{-\frac{3\gamma\alpha_1}{2}} f_{1, x_{12_j} x_{13_j}'}[\lambda] = 0, \\
& -2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \lambda \hbar \xi_{12_i} \xi_{23_i} + 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \gamma \hbar f_{\emptyset, x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{1, x_{12_j} x_{23_j}'}[\lambda] = \\
& 0, 2 e^{-\gamma(\alpha_1+\alpha_2)} \gamma \lambda^2 \hbar \xi_{12_i} \xi_{13_i} \xi_{23_i} - 2 e^{-\gamma(\alpha_1+\alpha_2)} \gamma \hbar f_{\emptyset, x_{13_j}}[\lambda] f_{\emptyset, x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - \\
& e^{-\gamma(\alpha_1+\alpha_2)} f_{\emptyset, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - e^{-\gamma(\alpha_1+\alpha_2)} f_{1, x_{13_j} x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - \\
& e^{-\gamma(\alpha_1+\alpha_2)} f_{\emptyset, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{13_j}'}[\lambda] - e^{-\gamma(\alpha_1+\alpha_2)} f_{1, x_{13_j}'}[\lambda] = 0, \\
& 2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \lambda \hbar \xi_{13_i} \xi_{23_i} - 2 e^{-\frac{3\gamma\alpha_2}{2}} \gamma \hbar f_{\emptyset, x_{23_j}}[\lambda] f_{\emptyset, x_{13_j}'}[\lambda] - e^{-\frac{3\gamma\alpha_2}{2}} f_{\emptyset, x_{23_j}}[\lambda] f_{1, x_{12_j} x_{23_j}'}[\lambda] - \\
& e^{-\frac{3\gamma\alpha_2}{2}} f_{1, x_{13_j} x_{23_j}'}[\lambda] = 0, -2 e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \hbar \xi_{12_i} - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} f_{1, a_{1k} x_{12_j}'}[\lambda] = 0, \\
& -2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \hbar \xi_{13_i} - 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \lambda \hbar \xi_{12_i} \xi_{23_i} - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{\emptyset, x_{23_j}}[\lambda] f_{1, a_{1k} x_{12_j}'}[\lambda] - \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{1, a_{1k} x_{13_j}'}[\lambda] = 0, -2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \hbar \xi_{13_i} - 2 e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} \lambda \hbar \xi_{12_i} \xi_{23_i} - \\
& e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{1, a_{2k} x_{23_j}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - e^{-\frac{1}{2}\gamma(\alpha_1+\alpha_2)} f_{1, a_{2k} x_{13_j}'}[\lambda] = 0, \\
& -2 e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} \hbar \xi_{23_i} - e^{\frac{1}{2}\gamma(\alpha_1-2\alpha_2)} f_{1, a_{2k} x_{23_j}'}[\lambda] = 0, -e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} f_{1, x_{12_k}'}[\lambda] = 0, \\
& 2 e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} \hbar \xi_{12_i} - e^{-\frac{1}{2}\gamma(2\alpha_1-\alpha_2)} f_{1, a_{1j} x_{12_k}'}[\lambda] = 0, \\
& 2 e^{-\frac{3\gamma\alpha_1}{2}} \gamma \lambda \hbar \xi_{12_i} \xi_{13_i} + \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma f_{\emptyset, x_{23_j}}[\lambda] f_{1, a_{1j} x_{12_k}}[\lambda] f_{\emptyset, x_{12_j}'}[\lambda] - e^{-\frac{3\gamma\alpha_1}{2}} f_{1, x_{12_k} x_{23_j}}[\lambda] \\
& f_{\emptyset, x_{12_j}'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \gamma f_{\emptyset, x_{23_j}}[\lambda] f_{1, a_{1k} x_{12_j}}[\lambda] f_{\emptyset, x_{12_k}'}[\lambda] + e^{-\frac{3\gamma\alpha_1}{2}} \gamma f_{1, a_{1k} x_{13_j}}[\lambda] f_{\emptyset, x_{12_k}'}[\lambda] - \\
& \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma f_{1, a_{2k} x_{13_j}}[\lambda] f_{\emptyset, x_{12_k}'}[\lambda] + \frac{1}{2} e^{-\frac{3\gamma\alpha_1}{2}} \gamma f_{1, a_{1j} x_{12_k}}[\lambda] f_{\emptyset, x_{13_j}'}[\lambda] - e^{-\frac{3\gamma\alpha_1}{2}} f_{1, x_{12_k} x_{13_j}'}[\lambda] = 0,
\end{aligned}$$

$$\begin{aligned}
& -2 e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \gamma \lambda \hbar \xi_{12_i} \xi_{23_i} - \frac{1}{2} e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \gamma f_{1, a_{2_k} x_{23_j}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] - \\
& \frac{1}{2} e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \gamma f_{1, a_{1_j} x_{12_k}} [\lambda] f_{\theta, x_{23_j}'} [\lambda] - e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} f_{1, x_{12_k} x_{23_j}'} [\lambda] = \theta, \\
& e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \gamma \lambda \hbar \xi_{12_i} \xi_{23_i} - e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \gamma \hbar f_{\theta, x_{23_k}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] - \\
& e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} f_{1, x_{23_k}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] - e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} f_{\theta, x_{23_k}} [\lambda] f_{1, x_{12_k}'} [\lambda] - e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} f_{1, x_{13_k}'} [\lambda] = \theta, \\
& 2 e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \hbar \xi_{13_i} + 2 e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \lambda \hbar \xi_{12_i} \xi_{23_i} - e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} f_{\theta, x_{23_k}} [\lambda] f_{1, a_{1_j} x_{12_k}'} [\lambda] - \\
& e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} f_{1, a_{1_j} x_{13_k}'} [\lambda] = \theta, 2 e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \hbar \xi_{13_i} + 2 e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} \lambda \hbar \xi_{12_i} \xi_{23_i} - \\
& e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} f_{1, a_{2_j} x_{23_k}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] - e^{-\frac{1}{2} \gamma (\alpha_1 + \alpha_2)} f_{1, a_{2_j} x_{13_k}'} [\lambda] = \theta, \\
& 2 e^{-\frac{3 \gamma \alpha_1}{2}} \gamma \lambda \hbar \xi_{12_i} \xi_{13_i} + e^{-\frac{3 \gamma \alpha_1}{2}} \gamma f_{\theta, x_{23_k}} [\lambda] f_{1, a_{1_j} x_{12_k}} [\lambda] f_{\theta, x_{12_j}'} [\lambda] + e^{-\frac{3 \gamma \alpha_1}{2}} \gamma f_{1, a_{1_j} x_{13_k}} [\lambda] \\
& f_{\theta, x_{12_j}'} [\lambda] - \frac{1}{2} e^{-\frac{3 \gamma \alpha_1}{2}} \gamma f_{1, a_{2_j} x_{13_k}} [\lambda] f_{\theta, x_{12_j}'} [\lambda] + \frac{1}{2} e^{-\frac{3 \gamma \alpha_1}{2}} \gamma f_{\theta, x_{23_k}} [\lambda] f_{1, a_{1_k} x_{12_j}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] - \\
& e^{-\frac{3 \gamma \alpha_1}{2}} f_{1, x_{12_j} x_{23_k}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] + \frac{1}{2} e^{-\frac{3 \gamma \alpha_1}{2}} \gamma f_{1, a_{1_k} x_{12_j}} [\lambda] f_{\theta, x_{13_k}'} [\lambda] - e^{-\frac{3 \gamma \alpha_1}{2}} f_{1, x_{12_j} x_{13_k}'} [\lambda] = \theta, \\
& 4 e^{-\gamma (\alpha_1 + \alpha_2)} \gamma \lambda^2 \hbar \xi_{12_i} \xi_{13_i} \xi_{23_i} + \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{\theta, x_{23_j}} [\lambda] f_{\theta, x_{23_k}} [\lambda] f_{1, a_{1_j} x_{12_k}} [\lambda] f_{\theta, x_{12_j}'} [\lambda] + \\
& \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{\theta, x_{23_j}} [\lambda] f_{1, a_{1_j} x_{13_k}} [\lambda] f_{\theta, x_{12_j}'} [\lambda] + \\
& \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{\theta, x_{23_j}} [\lambda] f_{1, a_{2_j} x_{13_k}} [\lambda] f_{\theta, x_{12_j}'} [\lambda] - e^{-\gamma (\alpha_1 + \alpha_2)} f_{\theta, x_{23_k}} [\lambda] f_{1, x_{12_k} x_{23_j}} [\lambda] f_{\theta, x_{12_j}'} [\lambda] - \\
& e^{-\gamma (\alpha_1 + \alpha_2)} f_{1, x_{13_k} x_{23_j}} [\lambda] f_{\theta, x_{12_j}'} [\lambda] + \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{\theta, x_{23_j}} [\lambda] f_{\theta, x_{23_k}} [\lambda] f_{1, a_{1_k} x_{12_j}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] + \\
& \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{\theta, x_{23_k}} [\lambda] f_{1, a_{1_k} x_{13_j}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] + \\
& \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{\theta, x_{23_k}} [\lambda] f_{1, a_{2_k} x_{13_j}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] - e^{-\gamma (\alpha_1 + \alpha_2)} f_{\theta, x_{23_j}} [\lambda] f_{1, x_{12_j} x_{23_k}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] - \\
& e^{-\gamma (\alpha_1 + \alpha_2)} f_{1, x_{13_j} x_{23_k}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] + \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{\theta, x_{23_k}} [\lambda] f_{1, a_{1_j} x_{12_k}} [\lambda] f_{\theta, x_{13_j}'} [\lambda] + \\
& \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{1, a_{1_j} x_{13_k}} [\lambda] f_{\theta, x_{13_j}'} [\lambda] + \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{1, a_{2_j} x_{13_k}} [\lambda] f_{\theta, x_{13_j}'} [\lambda] + \\
& \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{\theta, x_{23_j}} [\lambda] f_{1, a_{1_k} x_{12_j}} [\lambda] f_{\theta, x_{13_k}'} [\lambda] + \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{1, a_{1_k} x_{13_j}} [\lambda] f_{\theta, x_{13_k}'} [\lambda] + \\
& \frac{1}{2} e^{-\gamma (\alpha_1 + \alpha_2)} \gamma f_{1, a_{2_k} x_{13_j}} [\lambda] f_{\theta, x_{13_k}'} [\lambda] - e^{-\gamma (\alpha_1 + \alpha_2)} f_{\theta, x_{23_k}} [\lambda] f_{1, x_{12_k} x_{13_j}'} [\lambda] - \\
& e^{-\gamma (\alpha_1 + \alpha_2)} f_{\theta, x_{23_j}} [\lambda] f_{1, x_{12_j} x_{13_k}'} [\lambda] - e^{-\gamma (\alpha_1 + \alpha_2)} f_{1, x_{13_j} x_{13_k}'} [\lambda] = \theta, \\
& 2 e^{-\frac{3 \gamma \alpha_2}{2}} \gamma \lambda \hbar \xi_{13_i} \xi_{23_i} + \frac{1}{2} e^{-\frac{3 \gamma \alpha_2}{2}} \gamma f_{\theta, x_{23_k}} [\lambda] f_{1, a_{2_k} x_{23_j}} [\lambda] f_{\theta, x_{12_k}'} [\lambda] + \frac{1}{2} e^{-\frac{3 \gamma \alpha_2}{2}} \gamma f_{1, a_{2_k} x_{23_j}} [\lambda] \\
& f_{\theta, x_{13_k}'} [\lambda] - \frac{1}{2} e^{-\frac{3 \gamma \alpha_2}{2}} \gamma f_{\theta, x_{23_k}} [\lambda] f_{1, a_{1_j} x_{12_k}} [\lambda] f_{\theta, x_{23_j}'} [\lambda] - \frac{1}{2} e^{-\frac{3 \gamma \alpha_2}{2}} \gamma f_{1, a_{1_j} x_{13_k}} [\lambda] f_{\theta, x_{23_j}'} [\lambda] + \\
& e^{-\frac{3 \gamma \alpha_2}{2}} \gamma f_{1, a_{2_j} x_{13_k}} [\lambda] f_{\theta, x_{23_j}'} [\lambda] - e^{-\frac{3 \gamma \alpha_2}{2}} f_{\theta, x_{23_k}} [\lambda] f_{1, x_{12_k} x_{23_j}'} [\lambda] - e^{-\frac{3 \gamma \alpha_2}{2}} f_{1, x_{13_k} x_{23_j}'} [\lambda] = \theta, \\
& -e^{\frac{1}{2} \gamma (\alpha_1 - 2 \alpha_2)} f_{1, x_{23_k}'} [\lambda] = \theta, 2 e^{\frac{1}{2} \gamma (\alpha_1 - 2 \alpha_2)} \hbar \xi_{23_i} - e^{\frac{1}{2} \gamma (\alpha_1 - 2 \alpha_2)} f_{1, a_{2_j} x_{23_k}'} [\lambda] = \theta,
\end{aligned}$$

$$\begin{aligned}
& 4 e^{-\frac{1}{2} \gamma (\alpha 1_i + \alpha 2_i)} \gamma \hbar \xi 13_i + 2 e^{-\frac{1}{2} \gamma (\alpha 1_i + \alpha 2_i)} \gamma \lambda \hbar \xi 12_i \xi 23_i - \frac{1}{2} e^{-\frac{1}{2} \gamma (\alpha 1_i + \alpha 2_i)} \gamma f_{1, a2_j \times 23_k} [\lambda] f_{\theta, x12_j'} [\lambda] - \\
& \frac{1}{2} e^{-\frac{1}{2} \gamma (\alpha 1_i + \alpha 2_i)} \gamma f_{1, a1_k \times 12_j} [\lambda] f_{\theta, x23_k'} [\lambda] - e^{-\frac{1}{2} \gamma (\alpha 1_i + \alpha 2_i)} f_{1, x12_j \times 23_k'} [\lambda] = 0, \\
& 2 e^{-\frac{3 \gamma \alpha 2_i}{2}} \gamma \lambda \hbar \xi 13_i \xi 23_i + \frac{1}{2} e^{-\frac{3 \gamma \alpha 2_i}{2}} \gamma f_{\theta, x23_j} [\lambda] f_{1, a2_j \times 23_k} [\lambda] f_{\theta, x12_j'} [\lambda] + \frac{1}{2} e^{-\frac{3 \gamma \alpha 2_i}{2}} \gamma f_{1, a2_j \times 23_k} [\lambda] \\
& f_{\theta, x13_j'} [\lambda] - \frac{1}{2} e^{-\frac{3 \gamma \alpha 2_i}{2}} \gamma f_{\theta, x23_j} [\lambda] f_{1, a1_k \times 12_j} [\lambda] f_{\theta, x23_k'} [\lambda] - \frac{1}{2} e^{-\frac{3 \gamma \alpha 2_i}{2}} \gamma f_{1, a1_k \times 13_j} [\lambda] f_{\theta, x23_k'} [\lambda] + \\
& e^{-\frac{3 \gamma \alpha 2_i}{2}} \gamma f_{1, a2_k \times 13_j} [\lambda] f_{\theta, x23_k'} [\lambda] - e^{-\frac{3 \gamma \alpha 2_i}{2}} f_{\theta, x23_j} [\lambda] f_{1, x12_j \times 23_k'} [\lambda] - e^{-\frac{3 \gamma \alpha 2_i}{2}} f_{1, x13_j \times 23_k'} [\lambda] = 0, \\
& 2 e^{-\frac{3 \gamma \alpha 1_i}{2}} \gamma \lambda \hbar \xi 12_i \xi 13_i - 2 e^{-\frac{3 \gamma \alpha 1_i}{2}} \gamma \hbar f_{\theta, x13_k} [\lambda] f_{\theta, x12_k'} [\lambda] - \\
& e^{-\frac{3 \gamma \alpha 1_i}{2}} f_{1, x12_k \times 23_k} [\lambda] f_{\theta, x12_k'} [\lambda] - e^{-\frac{3 \gamma \alpha 1_i}{2}} f_{1, x12_k \times 13_k'} [\lambda] = 0, \\
& -2 e^{-\frac{1}{2} \gamma (\alpha 1_i + \alpha 2_i)} \gamma \lambda \hbar \xi 12_i \xi 23_i + 2 e^{-\frac{1}{2} \gamma (\alpha 1_i + \alpha 2_i)} \gamma \hbar f_{\theta, x23_k} [\lambda] f_{\theta, x12_k'} [\lambda] - e^{-\frac{1}{2} \gamma (\alpha 1_i + \alpha 2_i)} f_{1, x12_k \times 23_k'} [\lambda] = \\
& 0, 2 e^{-\gamma (\alpha 1_i + \alpha 2_i)} \gamma \lambda^2 \hbar \xi 12_i \xi 13_i \xi 23_i - 2 e^{-\gamma (\alpha 1_i + \alpha 2_i)} \gamma \hbar f_{\theta, x13_k} [\lambda] f_{\theta, x23_k} [\lambda] f_{\theta, x12_k'} [\lambda] - \\
& e^{-\gamma (\alpha 1_i + \alpha 2_i)} f_{\theta, x23_k} [\lambda] f_{1, x12_k \times 23_k} [\lambda] f_{\theta, x12_k'} [\lambda] - e^{-\gamma (\alpha 1_i + \alpha 2_i)} f_{1, x13_k \times 23_k} [\lambda] f_{\theta, x12_k'} [\lambda] - \\
& e^{-\gamma (\alpha 1_i + \alpha 2_i)} f_{\theta, x23_k} [\lambda] f_{1, x12_k \times 13_k'} [\lambda] - e^{-\gamma (\alpha 1_i + \alpha 2_i)} f_{1, x13_k^2} [\lambda] = 0, \\
& 2 e^{-\frac{3 \gamma \alpha 2_i}{2}} \gamma \lambda \hbar \xi 13_i \xi 23_i - 2 e^{-\frac{3 \gamma \alpha 2_i}{2}} \gamma \hbar f_{\theta, x23_k} [\lambda] f_{\theta, x13_k'} [\lambda] - \\
& e^{-\frac{3 \gamma \alpha 2_i}{2}} f_{\theta, x23_k} [\lambda] f_{1, x12_k \times 23_k'} [\lambda] - e^{-\frac{3 \gamma \alpha 2_i}{2}} f_{1, x13_k \times 23_k'} [\lambda] = 0 \}
\end{aligned}$$

In[*]:= **Count**[#, **Alternatives**@@**fs**, **∞**, **Heads**→**True**] & /@**eqns**

Out[*]=

{1, 3, 1, 1, 3, 1, 1, 7, 1, 5, 3, 11, 5, 1, 3, 3,
1, 1, 1, 15, 5, 7, 3, 3, 15, 49, 15, 1, 1, 5, 15, 5, 3, 11, 5}

In[*]:= **inits** = (**#**[0] == 0) & /@**fs**

Out[*]=

{f_{θ,x12j}[0] == 0, f_{θ,x13j}[0] == 0, f_{θ,x23j}[0] == 0, f_{θ,x12k}[0] == 0, f_{θ,x13k}[0] == 0,
f_{θ,x23k}[0] == 0, f_{1,x12j}[0] == 0, f_{1,x13j}[0] == 0, f_{1,x23j}[0] == 0, f_{1,x12j x13j}[0] == 0,
f_{1,x12j x23j}[0] == 0, f_{1,x13j²}[0] == 0, f_{1,x13j x23j}[0] == 0, f_{1,a1k x12j}[0] == 0, f_{1,a1k x13j}[0] == 0,
f_{1,a2k x13j}[0] == 0, f_{1,a2k x23j}[0] == 0, f_{1,x12k}[0] == 0, f_{1,a1j x12k}[0] == 0, f_{1,x12k x13j}[0] == 0,
f_{1,x12k x23j}[0] == 0, f_{1,x13k}[0] == 0, f_{1,a1j x13k}[0] == 0, f_{1,a2j x13k}[0] == 0, f_{1,x12j x13k}[0] == 0,
f_{1,x13j x13k}[0] == 0, f_{1,x13k x23j}[0] == 0, f_{1,x23k}[0] == 0, f_{1,a2j x23k}[0] == 0, f_{1,x12j x23k}[0] == 0,
f_{1,x13j x23k}[0] == 0, f_{1,x12k x13k}[0] == 0, f_{1,x12k x23k}[0] == 0, f_{1,x13k²}[0] == 0, f_{1,x13k x23k}[0] == 0}

```
In[*]:= ss = TriangularDSolve[eqns, inits, fs, λ, CF]
```

```
Out[*]=
```

```
{f0,x12j → Function[{λ}, λ ξ12i], f0,x23j → Function[{λ}, λ ξ23i],
f0,x13j → Function[{λ}, λ ξ13i], f0,x12k → Function[{λ}, λ ξ12i], f0,x23k → Function[{λ}, λ ξ23i],
f0,x13k → Function[{λ}, λ ξ13i], f1,x12j → Function[{λ}, 0], f1,x23j → Function[{λ}, 0],
f1,x13j → Function[{λ}, 0], f1,x12j x23j → Function[{λ}, 0], f1,x12j x13j → Function[{λ}, 0],
f1,x13j x23j → Function[{λ}, 0], f1,x13j2 → Function[{λ}, 0], f1,a1k x12j → Function[{λ}, -2 λ ħ ξ12i],
f1,a1k x13j → Function[{λ}, -2 λ ħ ξ13i], f1,a2k x23j → Function[{λ}, -2 λ ħ ξ23i],
f1,a2k x13j → Function[{λ}, -2 λ ħ ξ13i], f1,x12k → Function[{λ}, 0],
f1,a1j x12k → Function[{λ}, 2 λ ħ ξ12i], f1,x12k x23j → Function[{λ}, -γ λ2 ħ ξ12i ξ23i],
f1,x12k x13j → Function[{λ}, γ λ2 ħ ξ12i ξ13i], f1,a1j x13k → Function[{λ}, 2 λ ħ ξ13i],
f1,x23k → Function[{λ}, 0], f1,x13k → Function[{λ}, 0], f1,a2j x23k → Function[{λ}, 2 λ ħ ξ23i],
f1,a2j x13k → Function[{λ}, 2 λ ħ ξ13i], f1,x13k x23j → Function[{λ}, γ λ2 ħ ξ13i ξ23i],
f1,x12j x23k → Function[{λ}, 4 γ λ ħ ξ13i + γ λ2 ħ ξ12i ξ23i],
f1,x12j x13k → Function[{λ}, -γ λ2 ħ ξ12i ξ13i], f1,x13j x23k → Function[{λ}, -γ λ2 ħ ξ13i ξ23i],
f1,x13j x13k → Function[{λ}, 0], f1,x12k x23k → Function[{λ}, 0],
f1,x12k x13k → Function[{λ}, 0], f1,x13k x23k → Function[{λ}, 0], f1,x13k2 → Function[{λ}, 0]}
```

```
In[*]:= E[Total[fs] /. fp,u -> ep u (fp,u /. ss) [λ]] /. λ | ħ | γ -> 1
```

```
Out[*]=
```

```
E[x12j ξ12i - 2 e a1k x12j ξ12i + x12k ξ12i + 2 e a1j x12k ξ12i +
x13j ξ13i - 2 e a1k x13j ξ13i - 2 e a2k x13j ξ13i + x13k ξ13i + 2 e a1j x13k ξ13i +
2 e a2j x13k ξ13i + e x12k x13j ξ12i ξ13i - e x12j x13k ξ12i ξ13i + x23j ξ23i -
2 e a2k x23j ξ23i + x23k ξ23i + 2 e a2j x23k ξ23i - e x12k x23j ξ12i ξ23i +
e x13k x23j ξ13i ξ23i - e x13j x23k ξ13i ξ23i + e x12j x23k (4 ξ13i + ξ12i ξ23i) ]
```