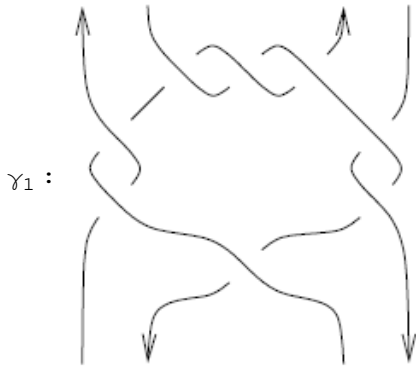


Pensieve Header: An attempt on the ribbon property on 6 strands. Continues RibbonPropertyV2.

```

dir = SetDirectory["C:/drorbn/AcademicPensieve/2014-06/"];
<< KnotTheory`
<< MetaCalculi/MetaCalculi-Program.m
Format[αa,b, StandardForm] := Interpretation[α10 a+b, αab];
Format[βa,b, StandardForm] := Interpretation[β10 a+b, βab];
Loading KnotTheory` version of April 3, 2014, 16:23:56.0784.
Read more at http://katlas.org/wiki/KnotTheory.
    
```



(γ₀ is the same, with all orientations going up) (everything with 6 strands!)

$$\{n = 6; \gamma_0 = \Gamma\left[\omega, \sum_{a=0}^n h_a \sigma_a, \sum_{a=1}^n \sum_{b=1}^n t_a h_b \alpha_{ab}\right], \gamma_1 = \gamma_0 // ds[2] // ds[4] // ds[6]\}$$

$$\left(\begin{array}{c|cccccc} \omega & s_1 & s_2 & s_3 & s_4 & s_5 & s_6 \\ \hline s_1 & \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} & \alpha_{15} & \alpha_{16} \\ s_2 & \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & \alpha_{25} & \alpha_{26} \\ s_3 & \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} & \alpha_{36} \\ s_4 & \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} & \alpha_{46} \\ s_5 & \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & \alpha_{56} \\ s_6 & \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} \\ \Sigma & \sigma_1 & \sigma_2 & \sigma_3 & \sigma_4 & \sigma_5 & \sigma_6 \end{array} \right), \left(\begin{array}{c} \omega (\alpha_{26} \alpha_{44} \alpha_{62} - \alpha_{24} \alpha_{46} \alpha_{62} - \alpha_{26} \alpha_{42} \alpha_{64} + \alpha_{22} \alpha_{46} \alpha_{64} + \alpha_{24} \alpha_{42} \alpha_{66} - \alpha_{22} \alpha_{44} \alpha_{66}) \\ \sigma_2 \sigma_4 \sigma_6 \\ s_1 \\ s_2 \\ s_3 \\ s_4 \\ s_5 \\ s_6 \\ \Sigma \end{array} \right) \left(\begin{array}{c} -\alpha_{16} \alpha_{24} \alpha_{42} \alpha_6 \\ \alpha_{26} \alpha_{34} \alpha_{42} \alpha_{61} \\ -\alpha_{26} \alpha_{44} \alpha_{52} \alpha_6 \end{array} \right)$$

```
{Ov =
  Xp[o1, 1] Xp[o2, 2] Xp[o3, 3] Xp[o4, 4] Xp[o5, 5] Xp[o6, 6] // Γ // dm[o1, o2, o] //
  dm[o, o3, o] // dm[o, o4, o] // dm[o, o5, o] // dm[o, o6, o],
  t1 = Ov ** (γ0 * Γ[ε[o]]), t2 = (γ0 * Γ[ε[o]]) ** Ov, ocond = Simplify[t1 == t2]}
```

$$\left\{ \begin{array}{cccccccc} 1 & s_1 & s_2 & s_3 & s_4 & s_5 & s_6 & s_o \\ s_1 & T_o & 0 & 0 & 0 & 0 & 0 & 0 \\ s_2 & 0 & T_o & 0 & 0 & 0 & 0 & 0 \\ s_3 & 0 & 0 & T_o & 0 & 0 & 0 & 0 \\ s_4 & 0 & 0 & 0 & T_o & 0 & 0 & 0 \\ s_5 & 0 & 0 & 0 & 0 & T_o & 0 & 0 \\ s_6 & 0 & 0 & 0 & 0 & 0 & T_o & 0 \\ s_o & 1 - T_o & 1 - T_o & 1 - T_o & 1 - T_o & 1 - T_o & 1 - T_o & 1 \\ \Sigma & T_o & T_o & T_o & T_o & T_o & T_o & 1 \end{array} \right\},$$

$$\left(\begin{array}{cccccccc} \omega & s_1 & s_2 & s_3 & s_4 & s_5 & s_6 & s_o \\ s_1 & T_o \alpha_{11} & T_o \alpha_{12} & T_o \alpha_{13} & T_o \alpha_{14} & T_o \alpha_{15} & T_o \alpha_{16} & 0 \\ s_2 & T_o \alpha_{21} & T_o \alpha_{22} & T_o \alpha_{23} & T_o \alpha_{24} & T_o \alpha_{25} & T_o \alpha_{26} & 0 \\ s_3 & T_o \alpha_{31} & T_o \alpha_{32} & T_o \alpha_{33} & T_o \alpha_{34} & T_o \alpha_{35} & T_o \alpha_{36} & 0 \\ s_4 & T_o \alpha_{41} & T_o \alpha_{42} & T_o \alpha_{43} & T_o \alpha_{44} & T_o \alpha_{45} & T_o \alpha_{46} & 0 \\ s_5 & T_o \alpha_{51} & T_o \alpha_{52} & T_o \alpha_{53} & T_o \alpha_{54} & T_o \alpha_{55} & T_o \alpha_{56} & 0 \\ s_6 & T_o \alpha_{61} & T_o \alpha_{62} & T_o \alpha_{63} & T_o \alpha_{64} & T_o \alpha_{65} & T_o \alpha_{66} & 0 \\ s_o & 1 - T_o & 1 - T_o & 1 - T_o & 1 - T_o & 1 - T_o & 1 - T_o & 1 \\ \Sigma & T_o \sigma_1 & T_o \sigma_2 & T_o \sigma_3 & T_o \sigma_4 & T_o \sigma_5 & T_o \sigma_6 & 1 \end{array} \right),$$

$$\left(\begin{array}{cccc} \omega & & s_1 & s_2 \\ s_1 & & T_o \alpha_{11} & T_o \alpha_{12} \\ s_2 & & T_o \alpha_{21} & T_o \alpha_{22} \\ s_3 & & T_o \alpha_{31} & T_o \alpha_{32} \\ s_4 & & T_o \alpha_{41} & T_o \alpha_{42} \\ s_5 & & T_o \alpha_{51} & T_o \alpha_{52} \\ s_6 & & T_o \alpha_{61} & T_o \alpha_{62} \\ s_o & -(-1 + T_o) & (\alpha_{11} + \alpha_{21} + \alpha_{31} + \alpha_{41} + \alpha_{51} + \alpha_{61}) & -(-1 + T_o) (\alpha_{12} + \alpha_{22} + \alpha_{32} + \alpha_{42} + \alpha_{52} + \alpha_{62}) & -(-1 + T_o) (\alpha_{13} + \alpha_{23} + \alpha_{33} + \alpha_{43} + \alpha_{53} + \alpha_{63}) & -(-1 + T_o) (\alpha_{14} + \alpha_{24} + \alpha_{34} + \alpha_{44} + \alpha_{54} + \alpha_{64}) & -(-1 + T_o) (\alpha_{15} + \alpha_{25} + \alpha_{35} + \alpha_{45} + \alpha_{55} + \alpha_{65}) & -(-1 + T_o) (\alpha_{16} + \alpha_{26} + \alpha_{36} + \alpha_{46} + \alpha_{56} + \alpha_{66}) \\ \Sigma & & T_o \sigma_1 & T_o \sigma_2 \end{array} \right)$$

$$\left. \begin{array}{l} (-1 + T_o) (-1 + \alpha_{12} + \alpha_{22} + \alpha_{32} + \alpha_{42} + \alpha_{52} + \alpha_{62}) == 0 \&\& \\ (-1 + T_o) (-1 + \alpha_{13} + \alpha_{23} + \alpha_{33} + \alpha_{43} + \alpha_{53} + \alpha_{63}) == 0 \&\& \\ (-1 + T_o) (-1 + \alpha_{14} + \alpha_{24} + \alpha_{34} + \alpha_{44} + \alpha_{54} + \alpha_{64}) == 0 \&\& \\ (-1 + T_o) (-1 + \alpha_{15} + \alpha_{25} + \alpha_{35} + \alpha_{45} + \alpha_{55} + \alpha_{65}) == 0 \&\& \\ (-1 + T_o) (-1 + \alpha_{16} + \alpha_{26} + \alpha_{36} + \alpha_{46} + \alpha_{56} + \alpha_{66}) == 0 \end{array} \right\}$$

```
ocond = FullSimplify[ocond /. {T_o -> 0}]
```

$$\begin{array}{l} \alpha_{11} + \alpha_{21} + \alpha_{31} + \alpha_{41} + \alpha_{51} + \alpha_{61} == 1 \&\& \alpha_{12} + \alpha_{22} + \alpha_{32} + \alpha_{42} + \alpha_{52} + \alpha_{62} == 1 \&\& \\ \alpha_{13} + \alpha_{23} + \alpha_{33} + \alpha_{43} + \alpha_{53} + \alpha_{63} == 1 \&\& \alpha_{14} + \alpha_{24} + \alpha_{34} + \alpha_{44} + \alpha_{54} + \alpha_{64} == 1 \&\& \\ \alpha_{15} + \alpha_{25} + \alpha_{35} + \alpha_{45} + \alpha_{55} + \alpha_{65} == 1 \&\& \alpha_{16} + \alpha_{26} + \alpha_{36} + \alpha_{46} + \alpha_{56} + \alpha_{66} == 1 \end{array}$$

```
{U = Xm[1, u1] Xm[2, u2] Xm[3, u3] Xm[4, u4] Xm[5, u5] Xm[6, u6] // Γ // dm[u1, u2, u] //
  dm[u, u3, u] // dm[u, u4, u] // dm[u, u5, u] // dm[u, u6, u],
  t1 = U ** (γ0 * Γ[ε[u]]), t2 = (γ0 * Γ[ε[u]]) ** U, ucond = FullSimplify[t1 == t2]}
```

$$\left(\begin{array}{c|c} \begin{matrix} 1 & s_1 & s_2 & s_3 & s_4 & s_5 & s_6 \\ s_1 & 1 & 0 & 0 & 0 & 0 & 0 \\ s_2 & 0 & 1 & 0 & 0 & 0 & 0 \\ s_3 & 0 & 0 & 1 & 0 & 0 & 0 \\ s_4 & 0 & 0 & 0 & 1 & 0 & 0 \\ s_5 & 0 & 0 & 0 & 0 & 1 & 0 \\ s_6 & 0 & 0 & 0 & 0 & 0 & 1 \\ s_u & 0 & 0 & 0 & 0 & 0 & 0 \\ \Sigma & 1 & 1 & 1 & 1 & 1 & 1 \end{matrix} & \begin{matrix} s_u \\ \frac{-1+T_1}{T_1} \\ \frac{-1+T_2}{T_1 T_2} \\ \frac{-1+T_3}{T_1 T_2 T_3} \\ \frac{-1+T_4}{T_1 T_2 T_3 T_4} \\ \frac{-1+T_5}{T_1 T_2 T_3 T_4 T_5} \\ \frac{-1+T_6}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} \end{matrix} \end{array} \right), \left(\begin{array}{c|c} \begin{matrix} \omega & s_1 & s_2 & s_3 & s_4 & s_5 & s_6 \\ s_1 & \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} & \alpha_{15} & \alpha_{16} \\ s_2 & \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & \alpha_{25} & \alpha_{26} \\ s_3 & \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} & \alpha_{36} \\ s_4 & \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} & \alpha_{46} \\ s_5 & \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & \alpha_{56} \\ s_6 & \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} \\ s_u & 0 & 0 & 0 & 0 & 0 & 0 \\ \Sigma & \sigma_1 & \sigma_2 & \sigma_3 & \sigma_4 & \sigma_5 & \sigma_6 \end{matrix} & \begin{matrix} \\ \frac{-T_2 T_3 T_4 T_5 T_6 \alpha_{11} + T_1 T_2 T_3 T_4 T_5 T_6 c}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{-T_2 T_3 T_4 T_5 T_6 \alpha_{21} + T_1 T_2 T_3 T_4 T_5 T_6 c}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{-T_2 T_3 T_4 T_5 T_6 \alpha_{31} + T_1 T_2 T_3 T_4 T_5 T_6 c}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{-T_2 T_3 T_4 T_5 T_6 \alpha_{41} + T_1 T_2 T_3 T_4 T_5 T_6 c}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{-T_2 T_3 T_4 T_5 T_6 \alpha_{51} + T_1 T_2 T_3 T_4 T_5 T_6 c}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{-T_2 T_3 T_4 T_5 T_6 \alpha_{61} + T_1 T_2 T_3 T_4 T_5 T_6 c}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \\ \\ \end{matrix} \end{array} \right)$$

$$\left(\begin{array}{c|c} \begin{matrix} \omega & s_1 & s_2 & s_3 & s_4 & s_5 & s_6 \\ s_1 & \alpha_{11} & \alpha_{12} & \alpha_{13} & \alpha_{14} & \alpha_{15} & \alpha_{16} \\ s_2 & \alpha_{21} & \alpha_{22} & \alpha_{23} & \alpha_{24} & \alpha_{25} & \alpha_{26} \\ s_3 & \alpha_{31} & \alpha_{32} & \alpha_{33} & \alpha_{34} & \alpha_{35} & \alpha_{36} \\ s_4 & \alpha_{41} & \alpha_{42} & \alpha_{43} & \alpha_{44} & \alpha_{45} & \alpha_{46} \\ s_5 & \alpha_{51} & \alpha_{52} & \alpha_{53} & \alpha_{54} & \alpha_{55} & \alpha_{56} \\ s_6 & \alpha_{61} & \alpha_{62} & \alpha_{63} & \alpha_{64} & \alpha_{65} & \alpha_{66} \\ s_u & 0 & 0 & 0 & 0 & 0 & 0 \\ \Sigma & \sigma_1 & \sigma_2 & \sigma_3 & \sigma_4 & \sigma_5 & \sigma_6 \end{matrix} & \begin{matrix} s_u \\ \frac{-1+T_1}{T_1} \\ \frac{-1+T_2}{T_1 T_2} \\ \frac{-1+T_3}{T_1 T_2 T_3} \\ \frac{-1+T_4}{T_1 T_2 T_3 T_4} \\ \frac{-1+T_5}{T_1 T_2 T_3 T_4 T_5} \\ \frac{-1+T_6}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} \\ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} \end{matrix} \end{array} \right), \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6}$$

$$\left. \begin{aligned} & (T_6 (T_5 (T_4 (T_3 ((-1 + T_1) T_2 (-1 + \alpha_{11}) + (-1 + T_2) \alpha_{12}) + (-1 + T_3) \alpha_{13}) + (-1 + T_4) \alpha_{14}) + \\ & \quad (-1 + T_5) \alpha_{15}) + (-1 + T_6) \alpha_{16}) = 0 \ \&\& \ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} \\ & (T_6 (T_5 (T_4 (-\alpha_{23} + T_3 (1 - \alpha_{22} + T_2 (-1 + (-1 + T_1) \alpha_{21} + \alpha_{22}) + \alpha_{23})) + (-1 + T_4) \alpha_{24}) + \\ & \quad (-1 + T_5) \alpha_{25}) + (-1 + T_6) \alpha_{26}) = 0 \ \&\& \ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} \\ & (T_6 (T_5 (-\alpha_{34} + T_4 (1 - \alpha_{33} + T_3 (-1 - \alpha_{32} + T_2 ((-1 + T_1) \alpha_{31} + \alpha_{32}) + \alpha_{33}) + \alpha_{34})) + \\ & \quad (-1 + T_5) \alpha_{35}) + (-1 + T_6) \alpha_{36}) = 0 \ \&\& \ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} \\ & (T_6 (-\alpha_{45} + T_5 (1 - \alpha_{44} + T_4 (-1 - \alpha_{43} + T_3 (-\alpha_{42} + T_2 ((-1 + T_1) \alpha_{41} + \alpha_{42}) + \alpha_{43}) + \alpha_{44}) + \alpha_{45})) + \\ & \quad (-1 + T_6) \alpha_{46}) = 0 \ \&\& \ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} (-\alpha_{56} + \\ & T_6 (1 - \alpha_{55} + T_5 (-1 - \alpha_{54} + T_4 (-\alpha_{53} + T_3 (-\alpha_{52} + T_2 ((-1 + T_1) \alpha_{51} + \alpha_{52}) + \alpha_{53}) + \alpha_{54}) + \alpha_{55}) + \\ & \quad \alpha_{56})) = 0 \ \&\& \ \frac{1}{T_1 T_2 T_3 T_4 T_5 T_6} (1 - \alpha_{66} + T_6 (-1 - \alpha_{65} + \\ & T_5 (-\alpha_{64} + T_4 (-\alpha_{63} + T_3 (-\alpha_{62} + T_2 ((-1 + T_1) \alpha_{61} + \alpha_{62}) + \alpha_{63}) + \alpha_{64}) + \alpha_{65}) + \alpha_{66})) = 0 \end{aligned} \right\}$$

Simplify[$\frac{\text{alex}}{\text{cert@w}}$]

$$\begin{aligned}
 & - (\alpha_{35} \alpha_{43} \alpha_{61} - \alpha_{36} \alpha_{43} \alpha_{61} - \alpha_{35} \alpha_{44} \alpha_{61} + \alpha_{36} \alpha_{44} \alpha_{61} - \alpha_{23} \alpha_{45} \alpha_{61} + \alpha_{24} \alpha_{45} \alpha_{61} - \alpha_{33} \alpha_{45} \alpha_{61} + \alpha_{34} \alpha_{45} \alpha_{61} + \\
 & \alpha_{23} \alpha_{46} \alpha_{61} - \alpha_{24} \alpha_{46} \alpha_{61} + \alpha_{33} \alpha_{46} \alpha_{61} - \alpha_{34} \alpha_{46} \alpha_{61} + \alpha_{35} \alpha_{53} \alpha_{61} - \alpha_{36} \alpha_{53} \alpha_{61} - \alpha_{35} \alpha_{54} \alpha_{61} + \\
 & \alpha_{36} \alpha_{54} \alpha_{61} - \alpha_{23} \alpha_{55} \alpha_{61} + \alpha_{24} \alpha_{55} \alpha_{61} - \alpha_{33} \alpha_{55} \alpha_{61} + \alpha_{34} \alpha_{55} \alpha_{61} + \alpha_{23} \alpha_{56} \alpha_{61} - \alpha_{24} \alpha_{56} \alpha_{61} + \\
 & \alpha_{33} \alpha_{56} \alpha_{61} - \alpha_{34} \alpha_{56} \alpha_{61} - \alpha_{35} \alpha_{43} \alpha_{62} + \alpha_{36} \alpha_{43} \alpha_{62} + \alpha_{35} \alpha_{44} \alpha_{62} - \alpha_{36} \alpha_{44} \alpha_{62} + \alpha_{23} \alpha_{45} \alpha_{62} - \\
 & \alpha_{24} \alpha_{45} \alpha_{62} + \alpha_{33} \alpha_{45} \alpha_{62} - \alpha_{34} \alpha_{45} \alpha_{62} - \alpha_{23} \alpha_{46} \alpha_{62} + \alpha_{24} \alpha_{46} \alpha_{62} - \alpha_{33} \alpha_{46} \alpha_{62} + \alpha_{34} \alpha_{46} \alpha_{62} - \\
 & \alpha_{35} \alpha_{53} \alpha_{62} + \alpha_{36} \alpha_{53} \alpha_{62} + \alpha_{35} \alpha_{54} \alpha_{62} - \alpha_{36} \alpha_{54} \alpha_{62} + \alpha_{23} \alpha_{55} \alpha_{62} - \alpha_{24} \alpha_{55} \alpha_{62} + \alpha_{33} \alpha_{55} \alpha_{62} - \\
 & \alpha_{34} \alpha_{55} \alpha_{62} - \alpha_{23} \alpha_{56} \alpha_{62} + \alpha_{24} \alpha_{56} \alpha_{62} - \alpha_{33} \alpha_{56} \alpha_{62} + \alpha_{34} \alpha_{56} \alpha_{62} - \alpha_{35} \alpha_{41} \alpha_{63} + \alpha_{36} \alpha_{41} \alpha_{63} + \\
 & \alpha_{35} \alpha_{42} \alpha_{63} - \alpha_{36} \alpha_{42} \alpha_{63} + \alpha_{21} \alpha_{45} \alpha_{63} - \alpha_{22} \alpha_{45} \alpha_{63} + \alpha_{31} \alpha_{45} \alpha_{63} - \alpha_{32} \alpha_{45} \alpha_{63} - \alpha_{21} \alpha_{46} \alpha_{63} + \\
 & \alpha_{22} \alpha_{46} \alpha_{63} - \alpha_{31} \alpha_{46} \alpha_{63} + \alpha_{32} \alpha_{46} \alpha_{63} - \alpha_{35} \alpha_{51} \alpha_{63} + \alpha_{36} \alpha_{51} \alpha_{63} + \alpha_{35} \alpha_{52} \alpha_{63} - \alpha_{36} \alpha_{52} \alpha_{63} + \\
 & \alpha_{21} \alpha_{55} \alpha_{63} - \alpha_{22} \alpha_{55} \alpha_{63} + \alpha_{31} \alpha_{55} \alpha_{63} - \alpha_{32} \alpha_{55} \alpha_{63} - \alpha_{21} \alpha_{56} \alpha_{63} + \alpha_{22} \alpha_{56} \alpha_{63} - \alpha_{31} \alpha_{56} \alpha_{63} + \\
 & \alpha_{32} \alpha_{56} \alpha_{63} + \alpha_{25} ((\alpha_{43} - \alpha_{44} + \alpha_{53} - \alpha_{54}) (\alpha_{61} - \alpha_{62}) - (\alpha_{41} - \alpha_{42} + \alpha_{51} - \alpha_{52}) (\alpha_{63} - \alpha_{64})) + \\
 & \alpha_{26} (- (\alpha_{43} - \alpha_{44} + \alpha_{53} - \alpha_{54}) (\alpha_{61} - \alpha_{62}) + (\alpha_{41} - \alpha_{42} + \alpha_{51} - \alpha_{52}) (\alpha_{63} - \alpha_{64})) + \\
 & \alpha_{35} \alpha_{41} \alpha_{64} - \alpha_{36} \alpha_{41} \alpha_{64} - \alpha_{35} \alpha_{42} \alpha_{64} + \alpha_{36} \alpha_{42} \alpha_{64} - \alpha_{21} \alpha_{45} \alpha_{64} + \alpha_{22} \alpha_{45} \alpha_{64} - \alpha_{31} \alpha_{45} \alpha_{64} + \\
 & \alpha_{32} \alpha_{45} \alpha_{64} + \alpha_{21} \alpha_{46} \alpha_{64} - \alpha_{22} \alpha_{46} \alpha_{64} + \alpha_{31} \alpha_{46} \alpha_{64} - \alpha_{32} \alpha_{46} \alpha_{64} + \alpha_{35} \alpha_{51} \alpha_{64} - \alpha_{36} \alpha_{51} \alpha_{64} - \\
 & \alpha_{35} \alpha_{52} \alpha_{64} + \alpha_{36} \alpha_{52} \alpha_{64} - \alpha_{21} \alpha_{55} \alpha_{64} + \alpha_{22} \alpha_{55} \alpha_{64} - \alpha_{31} \alpha_{55} \alpha_{64} + \alpha_{32} \alpha_{55} \alpha_{64} + \alpha_{21} \alpha_{56} \alpha_{64} - \\
 & \alpha_{22} \alpha_{56} \alpha_{64} + \alpha_{31} \alpha_{56} \alpha_{64} - \alpha_{32} \alpha_{56} \alpha_{64} + \alpha_{23} \alpha_{41} \alpha_{65} - \alpha_{24} \alpha_{41} \alpha_{65} + \alpha_{33} \alpha_{41} \alpha_{65} - \alpha_{34} \alpha_{41} \alpha_{65} - \\
 & \alpha_{23} \alpha_{42} \alpha_{65} + \alpha_{24} \alpha_{42} \alpha_{65} - \alpha_{33} \alpha_{42} \alpha_{65} + \alpha_{34} \alpha_{42} \alpha_{65} - \alpha_{21} \alpha_{43} \alpha_{65} + \alpha_{22} \alpha_{43} \alpha_{65} - \alpha_{31} \alpha_{43} \alpha_{65} + \\
 & \alpha_{32} \alpha_{43} \alpha_{65} + \alpha_{21} \alpha_{44} \alpha_{65} - \alpha_{22} \alpha_{44} \alpha_{65} + \alpha_{31} \alpha_{44} \alpha_{65} - \alpha_{32} \alpha_{44} \alpha_{65} + \alpha_{23} \alpha_{51} \alpha_{65} - \alpha_{24} \alpha_{51} \alpha_{65} + \\
 & \alpha_{33} \alpha_{51} \alpha_{65} - \alpha_{34} \alpha_{51} \alpha_{65} - \alpha_{23} \alpha_{52} \alpha_{65} + \alpha_{24} \alpha_{52} \alpha_{65} - \alpha_{33} \alpha_{52} \alpha_{65} + \alpha_{34} \alpha_{52} \alpha_{65} - \alpha_{21} \alpha_{53} \alpha_{65} + \\
 & \alpha_{22} \alpha_{53} \alpha_{65} - \alpha_{31} \alpha_{53} \alpha_{65} + \alpha_{32} \alpha_{53} \alpha_{65} + \alpha_{21} \alpha_{54} \alpha_{65} - \alpha_{22} \alpha_{54} \alpha_{65} + \alpha_{31} \alpha_{54} \alpha_{65} - \alpha_{32} \alpha_{54} \alpha_{65} + \\
 & (- (\alpha_{23} - \alpha_{24} + \alpha_{33} - \alpha_{34}) (\alpha_{41} - \alpha_{42} + \alpha_{51} - \alpha_{52}) + (\alpha_{21} - \alpha_{22} + \alpha_{31} - \alpha_{32}) (\alpha_{43} - \alpha_{44} + \alpha_{53} - \alpha_{54})) \\
 & \alpha_{66}) / (- \alpha_{14} \alpha_{36} \alpha_{52} - \alpha_{24} \alpha_{36} \alpha_{52} - \alpha_{14} \alpha_{46} \alpha_{52} - \alpha_{24} \alpha_{46} \alpha_{52} + \alpha_{12} \alpha_{36} \alpha_{54} + \\
 & \alpha_{22} \alpha_{36} \alpha_{54} + \alpha_{12} \alpha_{46} \alpha_{54} + \alpha_{22} \alpha_{46} \alpha_{54} + \alpha_{14} \alpha_{32} \alpha_{56} + \alpha_{24} \alpha_{32} \alpha_{56} - \alpha_{12} \alpha_{34} \alpha_{56} - \\
 & \alpha_{22} \alpha_{34} \alpha_{56} + \alpha_{14} \alpha_{42} \alpha_{56} + \alpha_{24} \alpha_{42} \alpha_{56} - \alpha_{12} \alpha_{44} \alpha_{56} - \alpha_{22} \alpha_{44} \alpha_{56} - \alpha_{14} \alpha_{36} \alpha_{62} - \\
 & \alpha_{24} \alpha_{36} \alpha_{62} - \alpha_{14} \alpha_{46} \alpha_{62} - \alpha_{24} \alpha_{46} \alpha_{62} + \alpha_{12} \alpha_{36} \alpha_{64} + \alpha_{22} \alpha_{36} \alpha_{64} + \alpha_{12} \alpha_{46} \alpha_{64} + \\
 & \alpha_{22} \alpha_{46} \alpha_{64} + \alpha_{16} (\alpha_{34} (\alpha_{52} + \alpha_{62}) + \alpha_{44} (\alpha_{52} + \alpha_{62}) - (\alpha_{32} + \alpha_{42}) (\alpha_{54} + \alpha_{64})) + \\
 & \alpha_{26} (\alpha_{34} (\alpha_{52} + \alpha_{62}) + \alpha_{44} (\alpha_{52} + \alpha_{62}) - (\alpha_{32} + \alpha_{42}) (\alpha_{54} + \alpha_{64})) + \alpha_{14} \alpha_{32} \alpha_{66} + \\
 & \alpha_{24} \alpha_{32} \alpha_{66} - \alpha_{12} \alpha_{34} \alpha_{66} - \alpha_{22} \alpha_{34} \alpha_{66} + \alpha_{14} \alpha_{42} \alpha_{66} + \alpha_{24} \alpha_{42} \alpha_{66} - \alpha_{12} \alpha_{44} \alpha_{66} - \alpha_{22} \alpha_{44} \alpha_{66})
 \end{aligned}$$

Unitarity of γ_0

$\Omega c[n_]$:= Table[Which[i < j, 0, i == j, $\frac{1}{1 - T_i}$, i > j, 1], {i, n}, {j, n}];

$\Omega c[n]$ // MatrixForm

$$\begin{pmatrix}
 \frac{1}{1-T_1} & 0 & 0 & 0 & 0 & 0 \\
 1 & \frac{1}{1-T_2} & 0 & 0 & 0 & 0 \\
 1 & 1 & \frac{1}{1-T_3} & 0 & 0 & 0 \\
 1 & 1 & 1 & \frac{1}{1-T_4} & 0 & 0 \\
 1 & 1 & 1 & 1 & \frac{1}{1-T_5} & 0 \\
 1 & 1 & 1 & 1 & 1 & \frac{1}{1-T_6}
 \end{pmatrix}$$

Transpose[γ0[A]].Ωc[n].(γ0[A] /. α → β) // MatrixForm

$$\begin{pmatrix} \left(\frac{\alpha_{11}}{1-T_1} + \alpha_{21} + \alpha_{31} + \alpha_{41} + \alpha_{51} + \alpha_{61}\right) \beta_{11} + \left(\frac{\alpha_{21}}{1-T_2} + \alpha_{31} + \alpha_{41} + \alpha_{51} + \alpha_{61}\right) \beta_{21} + \left(\frac{\alpha_{31}}{1-T_3} + \alpha_{41} + \alpha_{51} + \alpha_{61}\right) \beta_{31} + \left(\frac{\alpha_{41}}{1-T_4} + \alpha_{51} + \alpha_{61}\right) \beta_{41} + \left(\frac{\alpha_{51}}{1-T_5} + \alpha_{61}\right) \beta_{51} + \alpha_{61} \beta_{61} \\ \left(\frac{\alpha_{12}}{1-T_1} + \alpha_{22} + \alpha_{32} + \alpha_{42} + \alpha_{52} + \alpha_{62}\right) \beta_{11} + \left(\frac{\alpha_{22}}{1-T_2} + \alpha_{32} + \alpha_{42} + \alpha_{52} + \alpha_{62}\right) \beta_{21} + \left(\frac{\alpha_{32}}{1-T_3} + \alpha_{42} + \alpha_{52} + \alpha_{62}\right) \beta_{31} + \left(\frac{\alpha_{42}}{1-T_4} + \alpha_{52} + \alpha_{62}\right) \beta_{41} + \left(\frac{\alpha_{52}}{1-T_5} + \alpha_{62}\right) \beta_{51} + \alpha_{62} \beta_{61} \\ \left(\frac{\alpha_{13}}{1-T_1} + \alpha_{23} + \alpha_{33} + \alpha_{43} + \alpha_{53} + \alpha_{63}\right) \beta_{11} + \left(\frac{\alpha_{23}}{1-T_2} + \alpha_{33} + \alpha_{43} + \alpha_{53} + \alpha_{63}\right) \beta_{21} + \left(\frac{\alpha_{33}}{1-T_3} + \alpha_{43} + \alpha_{53} + \alpha_{63}\right) \beta_{31} + \left(\frac{\alpha_{43}}{1-T_4} + \alpha_{53} + \alpha_{63}\right) \beta_{41} + \left(\frac{\alpha_{53}}{1-T_5} + \alpha_{63}\right) \beta_{51} + \alpha_{63} \beta_{61} \\ \left(\frac{\alpha_{14}}{1-T_1} + \alpha_{24} + \alpha_{34} + \alpha_{44} + \alpha_{54} + \alpha_{64}\right) \beta_{11} + \left(\frac{\alpha_{24}}{1-T_2} + \alpha_{34} + \alpha_{44} + \alpha_{54} + \alpha_{64}\right) \beta_{21} + \left(\frac{\alpha_{34}}{1-T_3} + \alpha_{44} + \alpha_{54} + \alpha_{64}\right) \beta_{31} + \left(\frac{\alpha_{44}}{1-T_4} + \alpha_{54} + \alpha_{64}\right) \beta_{41} + \left(\frac{\alpha_{54}}{1-T_5} + \alpha_{64}\right) \beta_{51} + \alpha_{64} \beta_{61} \\ \left(\frac{\alpha_{15}}{1-T_1} + \alpha_{25} + \alpha_{35} + \alpha_{45} + \alpha_{55} + \alpha_{65}\right) \beta_{11} + \left(\frac{\alpha_{25}}{1-T_2} + \alpha_{35} + \alpha_{45} + \alpha_{55} + \alpha_{65}\right) \beta_{21} + \left(\frac{\alpha_{35}}{1-T_3} + \alpha_{45} + \alpha_{55} + \alpha_{65}\right) \beta_{31} + \left(\frac{\alpha_{45}}{1-T_4} + \alpha_{55} + \alpha_{65}\right) \beta_{41} + \left(\frac{\alpha_{55}}{1-T_5} + \alpha_{65}\right) \beta_{51} + \alpha_{65} \beta_{61} \\ \left(\frac{\alpha_{16}}{1-T_1} + \alpha_{26} + \alpha_{36} + \alpha_{46} + \alpha_{56} + \alpha_{66}\right) \beta_{11} + \left(\frac{\alpha_{26}}{1-T_2} + \alpha_{36} + \alpha_{46} + \alpha_{56} + \alpha_{66}\right) \beta_{21} + \left(\frac{\alpha_{36}}{1-T_3} + \alpha_{46} + \alpha_{56} + \alpha_{66}\right) \beta_{31} + \left(\frac{\alpha_{46}}{1-T_4} + \alpha_{56} + \alpha_{66}\right) \beta_{41} + \left(\frac{\alpha_{56}}{1-T_5} + \alpha_{66}\right) \beta_{51} + \alpha_{66} \beta_{61} \end{pmatrix}$$

```
unitarule = Thread[
  Flatten[Transpose[γ0[A]]] → Flatten[Simplify[
    Ωc[n].Inverse[Ωc[n].(γ0[A] /. α → β)] /. {T1|3|5 → T, T2|4|6 → 1 / T},
    TimeConstraint → 1
  ]
]
```

Simplify::time : Time spent on a transformation exceeded 1.` seconds, and the transformation was aborted. Increasing the value of TimeConstraint option may improve the result of simplification. >>

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Simplify::time : Time spent on a transformation exceeded 1.` seconds, and the transformation was aborted. Increasing the value of TimeConstraint option may improve the result of simplification. >>

General::stop : Further output of Simplify::time will be suppressed during this calculation. >>

A very large output was generated. Here is a sample of it:

$$\left\{ \alpha_{11} \rightarrow \frac{1}{(1-T) T^2 \langle\langle 1 \rangle\rangle} \right. \\ \left. (-1+T)^6 \left(\frac{\langle\langle 1 \rangle\rangle (\beta_{12} + \beta_{22} + \beta_{32} + \beta_{42} + \beta_{52} + \frac{T \beta_{62}}{-1+T})}{(-1+T)^3} - \frac{1}{(-1+T)^3} \left(- \langle\langle 1 \rangle\rangle (\beta_{12} + \beta_{22} + \beta_{32} + \beta_{42} + \frac{\beta_{52}}{1-T}) + \langle\langle 1 \rangle\rangle (\langle\langle 1 \rangle\rangle) - \langle\langle 1 \rangle\rangle + \langle\langle 1 \rangle\rangle (\beta_{16} + \beta_{26} + \beta_{36} + \beta_{46} + \frac{\beta_{56}}{1-T}) \right) \langle\langle 1 \rangle\rangle + \frac{\langle\langle 1 \rangle\rangle (\langle\langle 1 \rangle\rangle)}{\langle\langle 1 \rangle\rangle^3} - \frac{\langle\langle 1 \rangle\rangle (\beta_{15} + \beta_{25} + \langle\langle 1 \rangle\rangle + \langle\langle 1 \rangle\rangle + \beta_{\langle\langle 2 \rangle\rangle} + \frac{T \langle\langle 1 \rangle\rangle}{-1+T})}{(-1+T)^3} + \frac{\langle\langle 1 \rangle\rangle (\beta_{16} + \beta_{26} + \beta_{36} + \beta_{46} + \beta_{56} + \frac{T \beta_{66}}{-1+T})}{(-1+T)^3} \right), \right. \\ \alpha_{21} \rightarrow \frac{\langle\langle 1 \rangle\rangle^6 \langle\langle 1 \rangle\rangle}{\langle\langle 1 \rangle\rangle}, \langle\langle 32 \rangle\rangle, \alpha_{56} \rightarrow \frac{\langle\langle 1 \rangle\rangle}{\langle\langle 1 \rangle\rangle} + \langle\langle 5 \rangle\rangle, \\ \alpha_{66} \rightarrow -\frac{1}{\langle\langle 1 \rangle\rangle} T (\langle\langle 109 \rangle\rangle + \beta_{14} (-\beta_{22} \beta_{35} \beta_{43} \beta_{51} + \langle\langle 1 \rangle\rangle + \langle\langle 16 \rangle\rangle + \beta_{23} (\beta_{35} (\beta_{42} \beta_{51} - \beta_{41} \beta_{52}) + \beta_{32} (-\beta_{45} \beta_{51} + \beta_{\langle\langle 2 \rangle\rangle} \langle\langle 1 \rangle\rangle) + \beta_{31} (\beta_{45} \beta_{52} - \beta_{42} \beta_{55}))) + \frac{(-1+T) (\langle\langle 109 \rangle\rangle + \beta_{14} \langle\langle 1 \rangle\rangle)}{\langle\langle 1 \rangle\rangle} - \frac{(-1+T) (\langle\langle 1 \rangle\rangle)}{\langle\langle 1 \rangle\rangle} + \frac{(-1+T) (\langle\langle 1 \rangle\rangle)}{\langle\langle 1 \rangle\rangle} - \frac{(-1+T) (\langle\langle 1 \rangle\rangle)}{\langle\langle 1 \rangle\rangle} + \frac{(-1+T) (\langle\langle 109 \rangle\rangle + \beta_{15} (-\beta_{23} \beta_{36} \beta_{44} \beta_{52} + \langle\langle 1 \rangle\rangle + \langle\langle 16 \rangle\rangle + \beta_{24} \langle\langle 1 \rangle\rangle))}{\langle\langle 1 \rangle\rangle} \left. \right\}$$

Show Less	Show More	Show Full Output	Set Size Limit...
-----------	-----------	------------------	-------------------

```
ans1 = Simplify[
$$\frac{\omega / (\sigma_2 \sigma_4 \sigma_6)}{\text{cert@}\omega /. \text{unitarule}},$$

eqns && ucond && ocond /.  $\alpha \rightarrow \beta$ , TimeConstraint  $\rightarrow 1$ ]
```

Simplify::time : Time spent on a transformation exceeded 1.` seconds, and the transformation was aborted. Increasing the value of TimeConstraint option may improve the result of simplification. >>

Simplify::time : Time spent on a transformation exceeded 1.` seconds, and the transformation was aborted. Increasing the value of TimeConstraint option may improve the result of simplification. >>

Simplify::time : Time spent on a transformation exceeded 1.` seconds, and the transformation was aborted. Increasing the value of TimeConstraint option may improve the result of simplification. >>

General::stop : Further output of Simplify::time will be suppressed during this calculation. >>

\$Aborted

```
ans2 = Simplify[( $\sigma_2 \sigma_4 \sigma_6$ ) alex /  $\omega$ , eqns && ucond && ocond, TimeConstraint  $\rightarrow 1$ ]
```

$\alpha_{24} (\alpha_{41} - \alpha_{42}) + \alpha_{23} (-\alpha_{41} + \alpha_{42}) + (\alpha_{21} - \alpha_{22}) (\alpha_{43} - \alpha_{44})$

```
ans3 = ( $\alpha_{24} - \alpha_{23}$ ) ( $\alpha_{41} - \alpha_{42}$ ) + ( $\alpha_{21} - \alpha_{22}$ ) ( $\alpha_{43} - \alpha_{44}$ )
```

$(-\alpha_{23} + \alpha_{24}) (\alpha_{41} - \alpha_{42}) + (\alpha_{21} - \alpha_{22}) (\alpha_{43} - \alpha_{44})$

```
Simplify[{ans1 == ans2 /.  $\beta \rightarrow \alpha$ , ans2 == ans3}]
```

{True, True}