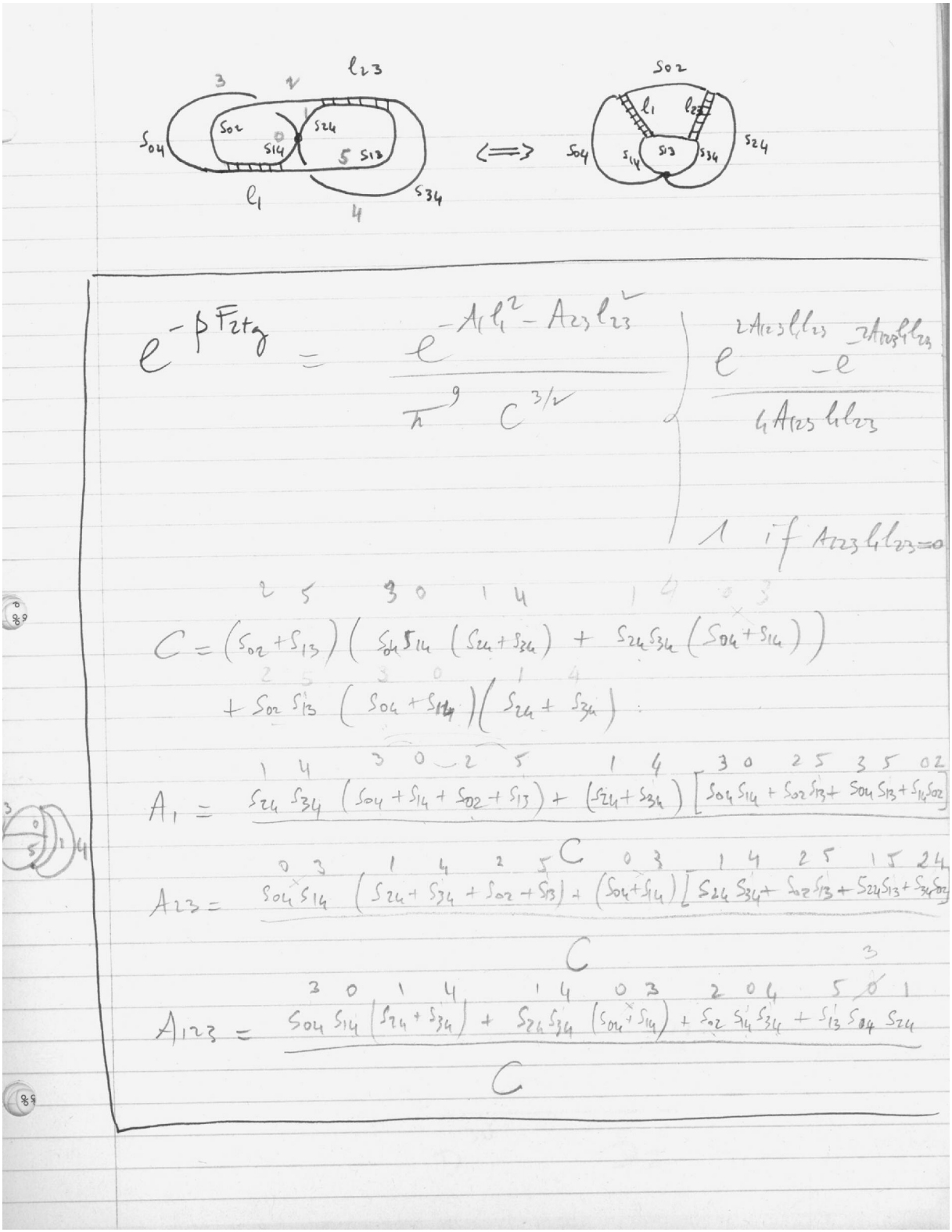
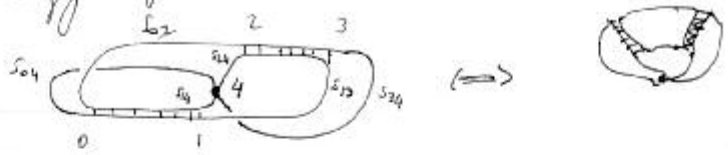
Example of conformational entropy calculation

Contribution to a helix nucleation transition within a « net » substructure

(scanned from the original notebook)



(1) Free energy of



$$\int e^{-\frac{r_4^2}{s_{04}} - \frac{(\vec{r}_4-\vec{r}_1)^2}{s_{14}} - \frac{(\vec{r}_4-\vec{r}_2)^2}{s_{24}} - \frac{(\vec{r}_4-\vec{r}_3)^2}{s_{34}}} e^{-\frac{(\vec{r}_3-\vec{r}_1)^2}{s_{13}}} e^{-\frac{s_{12}^2}{s_{02}}}$$

$$\frac{1}{\pi^9 \left(s_{04}\, s_{14}\, s_{24}\, s_{34}\, s_{13}\, s_{02}\right)^{3/2}} \quad \frac{\delta(|r_1| - l_1)}{4\pi l_1^2} \quad \frac{\delta(|\vec{r}_2 - \vec{r}_1| - l_{23})}{4\pi l_{23}^2}$$

$$d\vec{r}_1\, d\vec{r}_2\, d\vec{r}_3\, d\vec{r}_4$$

$$\int e^{-r_4^2\left(\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}\right) + 2\vec{r}_4 \cdot \left(\frac{\vec{r}_1}{s_{14}} + \frac{\vec{r}_2}{s_{24}} + \frac{\vec{r}_3}{s_{34}}\right)}$$

$$e^{-\frac{r_1^2}{s_{14}} - r_2^2\left(\frac{1}{s_{12}} + \frac{1}{s_{24}}\right) - \frac{r_3^2}{s_{34}} - \frac{(\vec{r}_3-\vec{r}_1)^2}{s_{13}}}$$

$$\left[\frac{1}{(\quad)}\right] \int \frac{1(\quad)}{4\pi l_1^2} \frac{\delta(\quad)}{4\pi l_{23}^2} \frac{4}{\pi} d\vec{r}_i$$

$$\int e^{-r_4^2\left(\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}\right) + 2\vec{r}_4 \cdot \left(\frac{\vec{r}_1}{s_{14}} + \frac{\vec{r}_2}{s_{24}} + \frac{\vec{r}_3}{s_{34}}\right)} d\vec{r}_4$$

$$= \left[\frac{\pi}{\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}}\right]^3 \int e^{\frac{\left(\frac{\vec{r}_1}{s_{14}} + \frac{\vec{r}_2}{s_{24}} + \frac{\vec{r}_3}{s_{34}}\right)^2}{\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}}}$$

(2).

$$\int e^{\frac{\left(\frac{\bar{r}_1}{s_{14}} + \frac{\bar{r}_2}{s_{24}} + \frac{\bar{r}_3}{s_{34}}\right)^2}{\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}} - \frac{(\bar{r}_3 - \bar{r}_2 + \bar{r}_2)^2}{s_{34}} - \frac{(\bar{r}_3 - \bar{r}_2 + \bar{r}_2 - \bar{r}_1)^2}{s_{13}}}$$

$$e^{-\frac{r_1^2}{s_{14}} - r_2^2\left(\frac{1}{s_{02}} + \frac{1}{s_{24}}\right)} \frac{\delta(|(\bar{r}_3 - \bar{r}_2)| - l_{23})}{4\pi l_{23}^2} d(\bar{r}_3 - \bar{r}_2)$$

$$\int e^{-(\bar{r}_3 - \bar{r}_2)^2\left[\frac{1}{s_{34}} + \frac{1}{s_{13}} - \frac{1}{s_{34}^2\left(\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}\right)}\right]}$$

$$e^{-2(\bar{r}_3 - \bar{r}_2)\cdot\left[\frac{\bar{r}_2}{s_{34}} + \frac{\bar{r}_2 - \bar{r}_1}{s_{13}} - \frac{\frac{\bar{r}_1}{s_{14}} + \bar{r}_2\left(\frac{1}{s_{14}} + \frac{1}{s_{34}}\right)}{s_{34}\left(\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}\right)}\right]}$$

$$e^{-\frac{r_1^2}{s_{14}} - r_2^2\left(\frac{1}{s_{02}} + \frac{1}{s_{24}}\right) + \left(\frac{\bar{r}_1}{s_{14}} + \bar{r}_2\left(\frac{1}{s_{24}} + \frac{1}{s_{34}}\right)\right)^2 \frac{1}{\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}}}$$

$$e^{-\frac{r_2^2}{s_{34}} - \frac{(\bar{r}_2 - \bar{r}_1)^2}{s_{13}}} \frac{\delta(|(\bar{r}_3 - \bar{r}_2)| - l_{23})}{4\pi l_{23}^2} d(\bar{r}_3 - \bar{r}_2)$$

$$\left[\frac{1}{s_{34}} + \frac{1}{s_{13}} - \frac{1}{s_{34}^2\left(\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}\right)}\right]$$

$$= \frac{\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}}}{s_{34}\left(\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{24}} + \frac{1}{s_{34}}\right)} + \frac{1}{s_{13}}$$

$$= \frac{s_{04}s_{14} + s_{14}s_{24} + s_{04}s_{24}}{s_{04}s_{14}s_{24} + s_{34}\left(s_{04}s_{14} + s_{14}s_{24} + s_{04}s_{24}\right)} + \frac{1}{s_{13}}$$

$$= \frac{(s_{34}+s_{13})(\quad) + s_{04}s_{14}s_{24}}{s_{13}\left[s_{04}s_{14}s_{24} + s_{34}(\quad)\right]}$$

(c)

(3) . . .

$$-2(\vec{r}_3-\vec{r}_2)\cdot\left[\vec{r}_2\left(\frac{1}{s_{34}}+\frac{1}{s_{13}}-\frac{\frac{1}{s_{24}}+\frac{1}{s_{34}}}{s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}\right)-\vec{r}_1\left(\frac{1}{s_{13}}+\frac{1}{s_{14}s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}\right)\right]$$

$$-2(\vec{r}_3-\vec{r}_2)\cdot\left[\vec{r}_2\left(\frac{\frac{1}{s_{04}}+\frac{1}{s_{14}}}{s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}+\frac{1}{s_{13}}\right)-\vec{r}_1\left(\frac{s_{14}s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)+s_{13}}{s_{13}s_{14}s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}\right)\right].$$

$$-2(\vec{r}_3-\vec{r}_2)\cdot\left[\vec{r}_2\,\frac{\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}\right)s_{13}+s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}{s_{34}s_{13}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}-\vec{r}_1\,\frac{s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)+s_{13}\frac{1}{s_{14}}}{s_{13}s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}\right]$$

$$-2(\vec{r}_3-\vec{r}_2)\cdot\underbrace{\frac{\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}\right)s_{13}+s_{34}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}{s_{34}s_{13}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)}}_{A}$$

$$\cdot\left[\vec{r}_2-\vec{r}_1\underbrace{\left(\frac{1+\frac{s_{13}}{s_{34}}\frac{1}{s_{14}}\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)^{-1}}{1+\frac{s_{13}}{s_{34}}\left(\frac{1}{s_{14}}+\frac{1}{s_{14}}\right)\left(\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)^{-1}}\right)}_{B}\right]$$

$$-2(\vec{r}_3-\vec{r}_2)\cdot A\left[\vec{r}_2-\vec{r}_1 B\right].$$

(4).

$$\int e^{-l_{23}^2 C} \; e^{-2A\, l_{23} \cos\vartheta \,\left|\vec{r}_2 - B\vec{r}_1\right|} \frac{2\pi l_{23}^2}{4\pi l_{23}^2} \sin\vartheta \, d\vartheta$$

$$= \frac{e^{-l_{23}^2 C}}{2} \cdot \frac{e^{2A l_{23}\left|\vec{r}_2 - B\vec{r}_1\right|} - e^{-2A l_{23}\left|\vec{r}_2 - B\vec{r}_1\right|}}{4A\, l_{23}\left|\vec{r}_2 - B\vec{r}_1\right|}$$

$$\int e^{-\frac{r_1^2}{s_{14}} - \left(\vec{r}_2 - B\vec{r}_1 + B\vec{r}_1\right)^2 \left(\frac{1}{s_{02}} + \frac{1}{s_{24}}\right)}$$

$$e^{+\frac{1}{\frac{1}{s_{04}} + \frac{1}{s_{14}} + \frac{1}{s_{23}} + \frac{1}{s_{34}}} \left[\left(\vec{r}_2 - B\vec{r}_1 + B\vec{r}_1\right)\left(\frac{1}{s_{24}} + \frac{1}{s_{34}}\right) + \frac{\vec{r}_1}{s_{14}}\right]^2}$$

$$e^{-\left(\vec{r}_2 - B\vec{r}_1 + B\vec{r}_1\right)^2 \frac{1}{s_{34}} - \left(\vec{r}_2 - B\vec{r}_1 + (B-1)\vec{r}_1\right)^2 \frac{1}{s_3}}$$

$$e^{-l_{23}^2 C} \frac{e^{2A l_{23}\left|\vec{r}_2 - B\vec{r}_1\right|} - e^{-2A l_{23}\left|\vec{r}_2 - B\vec{r}_1\right|}}{4A\, l_{23}\left|\vec{r}_2 - B\vec{r}_1\right|} \, d\vec{r}_1 \, d(\vec{r}_2 - B\vec{r}_1)$$

(5).

$$\int e^{-r_1^2\left[\frac{1}{s_{14}} + B^2\left(\frac{1}{s_{02}}+\frac{1}{s_{24}}\right) - \frac{1}{\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}}\left(B\left(\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)+\frac{1}{s_{14}}\right)^2\right.}$$

$$\left. + \frac{B^2}{s_{34}} + \frac{(B-1)^2}{s_{13}}\right].$$

$$e^{-2|\bar{r}_2 - B\bar{r}_1|\cos\vartheta\,|r_1|\left[B\left(\frac{1}{s_{02}}+\frac{1}{s_{24}}\right) - \frac{\frac{1}{s_{24}}+\frac{1}{s_{34}}}{\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}}\left(B\left(\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)+\frac{1}{s_{14}}\right)\right.}$$

$$\left. \frac{B}{s_{34}} + \frac{B-1}{s_{13}}\right] \quad (1).$$

$$e^{-(\bar{r}_2 - B\bar{r}_1)^2\left[\frac{1}{s_{02}}+\frac{1}{s_{24}} - \frac{\left(\frac{1}{s_{24}}+\frac{1}{s_{34}}\right)^2}{\frac{1}{s_{04}}+\frac{1}{s_{14}}+\frac{1}{s_{24}}+\frac{1}{s_{34}}} + \frac{1}{s_{34}} + \frac{1}{s_{13}}\right]} \quad (2).$$

$$e^{-l_{23}^2 C}\,\frac{e^{2A l_{23}|\bar{r}_2 - B\bar{r}_1|} - e^{-2A l_{23}|\bar{r}_2 - B\bar{r}_1|}}{4A\, l_{23}\,|\bar{r}_2 - B\bar{r}_1|}\, d\bar{r}_1 d(\bar{r}_2 - B\bar{r}_1)\,\frac{\delta(r_1 - l_1)}{4\pi l_1^2}$$

$$\rightarrow \boxed{\frac{A\cdot(1)}{(2)} = A_{123}.}$$

(6)

$$(1): \left[B \left\{ \frac{1}{S_{02}} + \left(\frac{1}{S_{24}} + \frac{1}{S_{34}} \right) \left[1 - \frac{\frac{1}{S_{24}} + \frac{1}{S_{34}}}{\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}}} \right] + \frac{1}{S_{13}} \right\} \right.$$

$$\left. - \frac{1}{S_{14}} \frac{\frac{1}{S_{24}} + \frac{1}{S_{34}}}{\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}}} - \frac{1}{S_{13}} \right] .$$

$$= \left[B \left\{ \frac{1}{S_{02}} + \frac{1}{S_{13}} + \frac{\left(\frac{1}{S_{24}} + \frac{1}{S_{34}} \right)\left(\frac{1}{S_{04}} + \frac{1}{S_{14}} \right)}{\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}}} \right\} \right.$$

$$\left. - \frac{1}{S_{14}} \frac{\frac{1}{S_{24}} + \frac{1}{S_{34}}}{\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}}} - \frac{1}{S_{13}} \right] .$$

$$(1) \quad A = \left[AB \left\{ \frac{1}{S_{02}} + \frac{1}{S_{13}} + \frac{\left(\frac{1}{S_{24}} + \frac{1}{S_{34}} \right)\left(\frac{1}{S_{04}} + \frac{1}{S_{14}} \right)}{\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}}} \right\} \right.$$

$$\left. - A \left(\frac{1}{S_{13}} + \frac{1}{S_{14}} \frac{\frac{1}{S_{24}} + \frac{1}{S_{34}}}{\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}}} \right) \right]$$

$$A = \frac{1}{S_{13}} + \frac{\frac{1}{S_{04}} + \frac{1}{S_{14}}}{S_{34}\left(\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}} \right)}$$

$$AB = \frac{1}{S_{13}} + \frac{\frac{1}{S_{14}}}{S_{34}\left(\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}} \right)}$$

$$(2) = \frac{1}{S_{02}} + \frac{1}{S_{13}} + \frac{\left(\frac{1}{S_{24}} + \frac{1}{S_{34}} \right)\left(\frac{1}{S_{04}} + \frac{1}{S_{14}} \right)}{\frac{1}{S_{04}} + \frac{1}{S_{14}} + \frac{1}{S_{24}} + \frac{1}{S_{34}}}$$

(7)

$$\frac{①\,A}{②} = AB - \frac{A}{②}\left[\frac{1}{S_{13}} + \frac{1}{S_{14}}\,\frac{\frac{1}{S_{24}} + \frac{1}{S_{34}}}{\frac{1}{S_{04}} + \cdots - \frac{1}{S_{34}}}\right].$$

$$A\left[\;\right] = \frac{\frac{1}{S_{13}}(\quad) + \frac{1}{S_{34}}\left(\frac{1}{S_{04}} + \frac{1}{S_{14}}\right)}{(\quad)} \cdot \frac{\frac{1}{S_{13}}(\quad) + \frac{1}{S_{14}}\left(\frac{1}{S_{24}} + \frac{1}{S_{34}}\right)}{(\quad)}$$

$$\frac{1}{②} = \frac{(\quad)}{\left(\frac{1}{S_{02}} + \frac{1}{S_{13}}\right)(\quad) + \left(\frac{1}{S_{04}} + \frac{1}{S_{14}}\right)\left(\frac{1}{S_{24}} + \frac{1}{S_{34}}\right)}$$

$$\frac{A\left[\;\right]}{②} = \frac{\left[\frac{1}{S_{13}}(\quad) + \frac{1}{S_{34}}\left(\frac{1}{S_{04}} + \frac{1}{S_{14}}\right)\right]\left[\frac{1}{S_{13}}(\quad) + \frac{1}{S_{14}}\left(\frac{1}{S_{24}} + \frac{1}{S_{34}}\right)\right]}{(\quad)\left[\left(\frac{1}{S_{02}} + \frac{1}{S_{13}}\right)(\quad) + \left(\frac{1}{S_{04}} + \frac{1}{S_{14}}\right)\left(\frac{1}{S_{24}} + \frac{1}{S_{34}}\right)\right]}$$

$$AB = \frac{\frac{1}{S_{13}}(\quad) + \frac{1}{S_{14}}\frac{1}{S_{34}}}{(\quad)}$$

$$AB - \frac{A\left[\;\right]}{②} = -\left[\frac{1}{S_{13}}(\quad) + \frac{1}{S_{34}}\left(\frac{1}{S_{04}} + \frac{1}{S_{14}}\right)\right]\left[\frac{1}{S_{13}}(\quad) + \frac{1}{S_{14}}\left(\frac{1}{S_{24}} + \frac{1}{S_{34}}\right)\right]$$
$$+ \left[\frac{1}{S_{13}}(\quad) + \frac{1}{S_{14}}\frac{1}{S_{34}}\right]\left[\left(\frac{1}{S_{02}} + \frac{1}{S_{13}}\right)(\quad) + \left(\frac{1}{S_{04}} + \frac{1}{S_{14}}\right)\left(\frac{1}{S_{24}} + \frac{1}{S_{34}}\right)\right]$$
$$\frac{(\quad)\left[\quad\right]}{}$$

(8)

$$AB - \frac{A E_{d}}{②} = \frac{1}{s_{13}} \frac{1}{s_{02}} \left(\quad \right)^2$$

$$\frac{1}{s_{13}} \left(\quad \right) \left\{ -\frac{1}{s_{14}} \left(\frac{1}{s_{24}} + \frac{1}{s_{34}} \right) - \frac{1}{s_{34}} \left(\frac{1}{s_{04}} + \frac{1}{s_{14}} \right) + \left(\frac{1}{s_{04}} + \frac{1}{s_{14}} \right) \left(\frac{1}{s_{24}} + \frac{1}{s_{34}} \right) \right.$$

$$\left. + \frac{1}{s_{14}} \frac{1}{s_{34}} \right\}$$

$$\frac{1}{s_{02}} \left(\quad \right) \frac{1}{s_{14}} \frac{1}{s_{34}}.$$

$$- \frac{1}{s_{14}} \frac{1}{s_{34}} \left(\frac{1}{s_{04}} + \frac{1}{s_{14}} \right) \left(\frac{1}{s_{24}} + \frac{1}{s_{34}} \right)$$

$$+ \frac{1}{s_{14}} \frac{1}{s_{34}} \left(\frac{1}{s_{04}} + \frac{1}{s_{14}} \right) \left(\frac{1}{s_{24}} + \frac{1}{s_{34}} \right).$$

$$\overline{\left(\quad \right) \left[\quad \right]}.$$

$$= \frac{\frac{1}{s_{13}} \frac{1}{s_{02}} \left(\quad \right)^2 + \frac{1}{s_{13}} \frac{1}{s_{04}} \frac{1}{s_{24}} \left(\quad \right) + \frac{1}{s_{34}} \frac{1}{s_{14}} \frac{1}{s_{02}} \left(\quad \right)}{\left(\quad \right) \left[\quad \right]}$$

$$= \frac{\frac{1}{s_{13}} \frac{1}{s_{02}} \left(\quad \right) + \frac{1}{s_{13}} \cdot \frac{1}{s_{04}} \frac{1}{s_{24}} + \frac{1}{s_{02}} \cdot \frac{1}{s_{14}} \cdot \frac{1}{s_{34}}}{\left(\frac{1}{s_{02}} + \frac{1}{s_{13}} \right) \left(\quad \right) + \left(\frac{1}{s_{04}} + \frac{1}{s_{14}} \right) \left(\frac{1}{s_{24}} + \frac{1}{s_{34}} \right)}$$

(9) : $\times\ S_{13}\,S_{12}\,S_{04}\,S_{14}\,S_{24}\,S_{34}$.

$$AB - AE\overrightarrow{2} = \frac{\left\{S_{14}S_{24}S_{34} + S_{04}S_{24}S_{34} + S_{02}S_{14}S_{34} + S_{04}S_{14}S_{24}\right\} + S_{02}S_{14}S_{34} + S_{13}S_{04}S_{24}}{\left(S_{02}+S_{13}\right)\{\quad\}}$$

$$+ S_{02}S_{13}\left(S_{04}+S_{14}\right)\left(S_{24}+S_{34}\right)$$

$$= \frac{\{\quad\} + S_{02}S_{14}S_{34} + S_{13}S_{04}S_{24}}{\left(S_{02}+S_{13}\right)\left(S_{04}+S_{14}\right)\left(S_{24}+S_{34}\right)\left[S_{02}/\!/S_{13} + S_{04}/\!/S_{14} + S_{24}/\!/S_{34}\right]}.$$

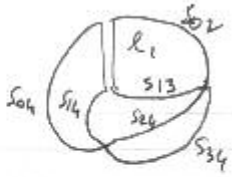
$$C = \left(S_{02}+S_{13}\right)\left\{S_{14}S_{24}S_{34} + S_{04}S_{24}S_{34} + S_{04}S_{14}S_{34} + S_{04}S_{14}S_{24}\right\}$$
$$+ S_{02}S_{13}\left(S_{04}+S_{14}\right)\left(S_{24}+S_{34}\right).$$

$$A_{R3} = \left\{S_{14}S_{24}S_{34} + S_{04}S_{24}S_{34} + S_{04}S_{14}S_{34} + S_{04}S_{14}S_{24}\right\}$$
$$+ S_{02}S_{14}S_{34} + S_{13}S_{04}S_{24}.$$

$$C = \left(S_{02}+S_{13}\right)\left(S_{04}+S_{14}\right)\left(S_{24}+S_{34}\right)\left[S_{02}/\!/S_{13} + S_{04}/\!/S_{14} + S_{24}/\!/S_{34}\right]$$

(10.) . . .

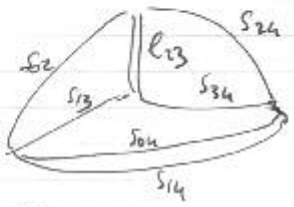
$l_{23} \to 0$



Fzt.: $s_{12} \to s_{13}$.
$s_{34} \to s_{24} // s_{34}$.

$$A_1 = \frac{s_{24}s_{34}\left(s_{04}+s_{14}+s_{02}+s_{13}\right)+\left(s_{24}+s_{34}\right)\left[s_{04}s_{14}+s_{02}s_{13}+s_{04}s_{13}+s_{14}s_{02}\right]}{\left(s_{04}s_{14}\left(s_{24}+s_{34}\right)+\left(s_{04}+s_{14}\right)s_{24}s_{34}\right)\left(s_{02}+s_{13}\right)+s_{02}s_{13}\left(s_{04}+s_{14}\right)\left(s_{24}+s_{34}\right)}$$

$l_1 \to 0$



As previous with $s_{04} \leftrightarrow s_{24}$
$s_{14} \leftrightarrow s_{34}$

$$A_{23} = \frac{s_{04}s_{14}\left(s_{24}+s_{34}+s_{02}+s_{13}\right)+\left(s_{04}+s_{14}\right)\left[s_{24}s_{34}+s_{02}s_{13}+s_{24}s_{13}+s_{34}s_{02}\right]}{C}$$