dm is ugly

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6:47 AM

$$hm_z^{xy}: \begin{array}{c|ccc} \omega & h_x & h_y & \cdots \\ \hline \vdots & \alpha & \beta & \gamma \end{array} \mapsto \begin{array}{c|cc} \omega & h_z & \cdots \\ \hline \vdots & \alpha+\beta+\langle\alpha\rangle\beta & \gamma \end{array},$$

$$sw_{xy}^{th}: \begin{array}{c|cc} \omega & h_y & \cdots \\ \hline t_x & \alpha & \beta \\ \vdots & \gamma & \delta \end{array} \mapsto \begin{array}{c|cc} \omega\epsilon & h_y & \cdots \\ \hline t_x & \alpha(1+\langle\gamma\rangle/\epsilon) & \beta(1+\langle\gamma\rangle/\epsilon) \\ \vdots & \gamma/\epsilon & \delta-\gamma\beta/\epsilon \end{array}$$

$\epsilon = 1+\alpha$

$h_1 t_1 h_2 t_2 \longrightarrow h_1 h_2' t_1' t_2$

$$\begin{array}{c|ccc} w & h_1 & h_2 & h_3 \\ \hline t_1 & \alpha_{11} & \alpha_{12} & \alpha_{13} \\ t_2 & \alpha_{21} & \alpha_{22} & \alpha_{23} \\ t_3 & \alpha_{31} & \alpha_{32} & \alpha_{33} \end{array} \xmapsto{sw_{12}} \begin{array}{c|ccc} w(1+\alpha_{12}) & h_1 & h_2 & h_3 \\ \hline t_1 & \alpha_{11}(-) & \alpha_{12}\left(1+\frac{\alpha_{22}+\alpha_{32}}{1+\alpha_{12}}\right) & \alpha_{13}(-) \\ t_2 & \alpha_{21}-\alpha_{22}\alpha_{11}/1+\alpha_{12} & \alpha_{22}/1+\alpha_{12} & \alpha_{23}-\frac{\alpha_{22}\alpha_{13}}{1+\alpha_{12}} \\ t_3 & \alpha_{31}-\frac{\alpha_{32}\alpha_{11}}{1+\alpha_{12}} & \alpha_{32}/1+\alpha_{12} & \alpha_{33}-\frac{\alpha_{32}\alpha_{13}}{1+\alpha_{12}} \end{array}$$

$$\xmapsto{tm} \begin{array}{c|c} w(1+\alpha_{12}) & \\ \hline & \end{array}$$

$$\alpha_{11}\left(1+\frac{\alpha_{22}+\alpha_{32}}{1+\alpha_{12}}\right)+\alpha_{21}-\frac{\alpha_{22}\alpha_{11}}{1+\alpha_{12}} =$$

$$\frac{\alpha_{11}+\alpha_{11}(\alpha_{12}+\alpha_{22}+\alpha_{32})+\alpha_{21}+\alpha_{21}\alpha_{12}-\alpha_{22}\alpha_{11}}{1+\alpha_{12}} =$$

$$\frac{\alpha_{11}+\alpha_{21}+\alpha_{11}\alpha_{12}+\alpha_{11}\alpha_{32}+\alpha_{21}\alpha_{12}}{}$$

$$\frac{\alpha_{11}+\alpha_{21}+\alpha_{11}\alpha_{12}+\alpha_{11}\alpha_{32}+\alpha_{21}\alpha_{12}}{1+\alpha_{12}}$$

$$\langle h_1\rangle = \text{above} + \alpha_{31} - \frac{\alpha_{32}\alpha_{11}}{1+\alpha_{12}} =$$

$$\frac{\alpha_{31}+\alpha_{31}\alpha_{12}-\cancel{\alpha_{32}\alpha_{11}}+\alpha_{11}+\alpha_{21}+\alpha_{11}\alpha_{12}+\cancel{\alpha_{11}\alpha_{32}}+\alpha_{21}\alpha_{12}}{1+\alpha_{12}}$$

$$= \frac{\alpha_{31}+\alpha_{11}+\alpha_{21}+\alpha_{12}(\alpha_{31}+\alpha_{11}+\alpha_{21})}{1+\alpha_{12}} = \alpha_{11}+\alpha_{21}+\alpha_{31}$$

$$\alpha_{31} - \frac{\alpha_{32}\alpha_{11}}{1+\alpha_{12}} + (1+\alpha_{11}+\alpha_{21}+\alpha_{31})\left(\frac{\alpha_{32}}{1+\alpha_{12}}\right)$$

$$= \frac{\alpha_{31}+\alpha_{31}\alpha_{12}-\cancel{\alpha_{32}\alpha_{11}}+\alpha_{32}+\cancel{\alpha_{32}\alpha_{11}}+\alpha_{32}\alpha_{21}+\alpha_{32}\alpha_{31}}{1+\alpha_{12}}$$

$$= \frac{\alpha_{31}+\alpha_{32}+\alpha_{31}\alpha_{12}+\alpha_{32}\alpha_{21}+\alpha_{32}\alpha_{31}}{1+\alpha_{12}}$$

$$= \alpha_{31}+\alpha_{32}\frac{1+\alpha_{21}+\alpha_{31}}{1+\alpha_{12}}$$