The transformation of a `DECA` is given as

$$\begin{aligned} &\exp(:F_{\rm in}:)\exp(:a\mathtt{L}:)\exp(:H_4/2:)\exp(:b\mathtt{L}:) \\ \times &\exp(:V_4:)\exp(:a\mathtt{L}:)\exp(:H_4/2:)\exp(:b\mathtt{L}:)\exp(:F_{\rm out}:)\,, \end{aligned} \tag{106}$$

where `L` and H_4 are the Hamiltonians of a drift of length `L` and a thin decapole kick with integrated strength `K4`:

$$H_4 = \frac{\mathtt{K4}}{5!}\Re(x-iy)^5\,, \tag{107}$$

respectively. The coeffients are $a \equiv 1/2 - 1/\sqrt{12}$ and $b = 1/2 - a$. Terms $\exp(:F_{\rm in}:)$ and $\exp(:F_{\rm out}:)$ are transformations for entrance and exit nonlinear fringes. The term $\exp(:V_4:)$ is a correction to adjust the third-order terms in `L`:

$$V_4 = \sum_{j=(x,y),k=(x,y)} -\frac{\beta}{2}H_{4,k}^2 + \gamma H_{4,j}H_{4,k}H_{4,j,k}\,, \tag{108}$$

where $,i$ represents the derivative by x or y. We have also introduced two coefficients $\beta \equiv 1/6 - 1/\sqrt{48}$ and $\gamma = 1/40 - 1/(24\sqrt{3})$.