The transformation of a DECA is given as

$$\exp(: F_{\text{in}} :)\exp(: a\mathtt{L} :)\exp(: H_4/2 :)\exp(: b\mathtt{L} :)$$
$$\times\exp(: V_4 :)\exp(: a\mathtt{L} :)\exp(: H_4/2 :)\exp(: b\mathtt{L} :)\exp(: F_{\text{out}} :)\,, \tag{106}$$

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 $\exp(: F_{\text{in}} :)$ and $\exp(: F_{\text{out}} :)$ 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 $\gamma = 1/40 - 1/(24\sqrt{3})$.