The transformation of a `DODECA` is given as

$$\begin{aligned} &\exp(:F_{\text{in}}:)\exp(:a\mathtt{L}:)\exp(:H_5/2:)\exp(:b\mathtt{L}:) \\ &\times\exp(:V_5:)\exp(:a\mathtt{L}:)\exp(:H_5/2:)\exp(:b\mathtt{L}:)\exp(:F_{\text{out}}:)\,, \end{aligned} \tag{110}$$

where `L` and H_5 are the Hamiltonians of a drift of length `L` and a thin dodecapole kick with integrated strength `K5`:

$$H_5 = \frac{\mathtt{K5}}{6!}\Re(x-iy)^6\,, \tag{111}$$

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 $\exp(:V_5:)$ is a correction to adjust the third-order terms in `L`:

$$V_5 = \sum_{j=(x,y),k=(x,y)} -\frac{\beta}{2}H_{5,k}^2 + \gamma H_{5,j}H_{5,k}H_{5,j,k}\,, \tag{112}$$

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