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 $\gamma=1/40-1/(24\sqrt{3})$.