

The transformation of a DODECA is given as

$$\exp(: F_{\text{in}} :)\exp(: aL :)\exp(: H_5/2 :)\exp(: bL :)\times \exp(: V_5 :)\exp(: aL :)\exp(: H_5/2 :)\exp(: bL :)\exp(: F_{\text{out}} :),$$

where L and H_5 are the Hamiltonians of a drift of length L and a thin dodecapole kick with integrated strength K_5 :

$$H_5 = \frac{K_5}{6!}\Re(x-iy)^6\,,$$

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 transformation nonlinear fringes. The term $\exp(: V_5 :)$ is a correction to adjust the third-order terms in L :

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

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