The transformation of a `OCT` is given as

$$\begin{aligned}
&\exp(:F_{\text{in}}:)\exp(:a\mathtt{L}:)\exp(:H_3/2:)\exp(:b\mathtt{L}:)\\
&\times\exp(:V_3:)\exp(:a\mathtt{L}:)\exp(:H_3/2:)\exp(:b\mathtt{L}:)\exp(:F_{\text{out}}:)\,,
\end{aligned}$$

where `L` and H_3 are the Hamiltonians of a drift of length `L` and a thin octupole kick with integrated strength `K3`:

$$H_3 = \frac{\mathtt{K3}}{4!}\Re(x-iy)^4\,,$$

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 $\exp(:V_3:)$ is a correction to adjust the third-order terms in `L`:

$$V_3 = \sum_{j=(x,y),k=(x,y)} -\frac{\beta}{2}H_{3,k}^2 + \gamma H_{3,j}H_{3,k}H_{3,j,k}\,,$$

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