The transformation of a `OCT` is given as

$$
\begin{aligned}
&\exp(:F_{\rm in}:)\exp(:a\mathtt{L}:)\exp(:H_3/2:)\exp(:b\mathtt{L}:)\\
\times &\exp(:V_3:)\exp(:a\mathtt{L}:)\exp(:H_3/2:)\exp(:b\mathtt{L}:)\exp(:F_{\rm out}:)\,,
\end{aligned}
\tag{160}
$$

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

$$
H_3 = \frac{\mathtt{K3}}{4!}\Re(x-iy)^4\,, \tag{161}
$$

respectively. The coeffients are $a \equiv 1/2 - 1/\sqrt{12}$ and $b = 1/2 - a$. Terms $\exp(:F_{\rm in}:)$ and $\exp(:F_{\rm out}:)$ are transformations for entrance and exit nonlinear fringes. The term $\exp(:V_3:)$ is a correction to adjust the third-order terms in `L`:

$$
V_3 = \sum_{j=(x,y),k=(x,y)} -\frac{\beta}{2}H_{3,k}^2 + \gamma H_{3,j}H_{3,k}H_{3,j,k}\,, \tag{162}
$$

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