a canonical transformation by a generating function:

$$G(x_1, p_{x2}, y_1, p_{y2}, p_1) = H_0(x_1, p_{x2}, y_1, p_{y2}, p_1) + \frac{1}{2}\left(\frac{\partial H_0}{\partial x_1}\frac{\partial H_0}{\partial p_{x2}} + \frac{\partial H_0}{\partial y_1}\frac{\partial H_0}{\partial p_{y2}}\right),$$

where

$$\begin{aligned}
H_0 &= p_{x2}\Delta x_1 + p_{y2}\Delta y_1\,,\\
\Delta x_1 &= x_1(a/3 + b)\,,\\
\Delta y_1 &= -y_1(a + b/3)\,,\\
a &= -\mathtt{K1}\frac{x_1^2}{4p_1}\,,\\
b &= -\mathtt{K1}\frac{y_1^2}{4p_1}\,.
\end{aligned}$$