a canonical transformation by a generating function:

$$G(x_1, p_{x2}, y_1, p_{y2}, p_1) = H_0(x_1, p_{x2}, y_1, p_{y2}, p_1) + \frac{1}{2}\left(\frac{\partial H_0}{\partial x_1}\frac{\partial H_0}{\partial p_{x2}} + \frac{\partial H_0}{\partial y_1}\frac{\partial H_0}{\partial p_{y2}}\right), \tag{186}$$

where

$$H_0 = p_{x2}\Delta x_1 + p_{y2}\Delta y_1\,, \tag{187}$$

$$\Delta x_1 = x_1(a/3 + b)\,, \tag{188}$$

$$\Delta y_1 = -y_1(a + b/3)\,, \tag{189}$$

$$a = -\mathtt{K1}\frac{x_1^2}{4p_1}\,, \tag{190}$$

$$b = -\mathtt{K1}\frac{y_1^2}{4p_1}\,. \tag{191}$$