The equation for horizontal motion in y-directoin is given by:

$$y(t) = \beta_{y,1} e^{\alpha t} + \beta_{y,2} e^{-\alpha t} + p_y(t) \tag{1}$$

where

$$\begin{aligned}
\beta_{y,1} &= \frac{(y_0 - p_{0,y})}{2} + \frac{\dot{y}_0 T - (p_{T,y} - p_{0,y})}{2\alpha T}, \\
\beta_{y,2} &= \frac{(y_0 - p_{0,y})}{2} - \frac{\dot{y}_0 T - (p_{T,y} - p_{0,y})}{2\alpha T}, \\
\alpha &= \sqrt{\frac{g}{h}}.
\end{aligned}$$