$$e \approx 0.0549$$

$$z = \begin{pmatrix} \beta(t) \\ \beta^2(t) \\ \dot{\beta}(t) \\ \mu(1-\mu)\alpha(t) \end{pmatrix}$$

$$\ddot{x} - 2\dot{y} = \frac{\partial U}{\partial x}$$

$$\ddot{y} + 2\dot{x} = \frac{\partial U}{\partial y}$$

$$\ddot{z} = \frac{\partial U}{\partial z}$$

$$U = \frac{1}{2}(x^2 + y^2) + \frac{1-\mu}{r_1} + \frac{\mu}{r_2}$$

CRTBP Eqn. Motion

ERTBP APPROXIMATE MODEL