Θ

Φ

L1

L2

M1

M2

For stability to be maintained, the center of mass must be directly above the Y-axis:

$$R\_{x}=0=\frac{\sum\_{}^{}M\* R\_{x}}{\sum\_{}^{}M}=\frac{M\_{2}L\_{2}cosΘ-M\_{1}L\_{1}sinΦ}{M\_{2}+M\_{1}}$$

This implies:

$$M\_{1}L\_{1}sinΦ=M\_{2}L\_{2}cosΘ$$

Using small angle approximation:

$$M\_{1}L\_{1}Φ=M\_{2}L\_{2}\left(1-\frac{Θ^{2}}{2}\right)$$

$$1-\frac{Θ^{2}}{2}=\frac{M\_{1}}{M\_{2}}\*\frac{L\_{1}}{L\_{2}}\*Φ$$