Exercise 2

February 5, 2014

Recall the Phugoid model:

$$v'(t) = -\sin\theta - Rv^2$$
$$\theta'(t) = v - \frac{\cos\theta}{v}$$

1. Find the equilibrium points of this dynamical system. State what kind of behavior they represent physically.
2. Are these equilibria stable or not? What if $R = 0$? Give a physical explanation.
3. Run some numerical experiments with solutions starting at the equilibrium points and near the equilibrium points. Do your numerical solutions exhibit the correct behavior with respect to stability?
4. Can you prove existence and uniqueness of the solution? Under what conditions? What do those conditions mean physically?