**Non-dimensional Equations of motion are:**

(1)

Where:

All dimensional quantities are originally normalized by :

A symmetrical case is considered and it is:

Equilibrium point is :

That point is known to be stable

Linearizing about that equilibrium point:

…

After all calculations we can describe **the linearized equations as:**

**M**

**Where :**

The natural frequencies can be calculated from :

For the y component we get :

The other frequencies can be shown numerically. For example:

OR: