**Longitudinal equations of motion**

**Axial force**



**Normal force**



**Pitching Moment**



**Lateral –direction equations of motion**

**Side force**



**Rolling Moment**



**Yawing Moment**



Where

=volume characteristic size of the tail

=volume characteristic size of the wing

**Typical second order differential equation**

**Solution of a typical second order equation**

**Period of oscillation**

Period

**Time to half amplitude or time to double amplitude**

or