DEPARTMENT OF AEROSPACE ENGINEERING

I I T Kanpur

Assignment Exam 4: Helicopter Theory

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1. The homogeneous part of the flap equation of a rotor blade in forward flight is given below.

$$\ddot{\beta} + \dot{\beta}\gamma\left\{\frac{1}{8} + \frac{\mu}{6}\sin\psi\right\} + \beta\left\{1 + \gamma\mu\cos\psi\left\{\frac{1}{6} + \frac{\mu}{4}\sin\psi\right\}\right\} = 0$$

Assume that the Lock Number γ=8.

Evaluate the response of the blade at **different** forward speeds μ= (0, 0.5, 1.0, 1.4 2.0) and plot the response in one graph.

Assume the same initial conditions $\beta(0)=0.6$ and $\dot{\beta}(0)=0$, for all the forward speeds.

Note: The derivatives are with respect to non-dimensional time