2.003 Fall 1999 Correction to Problem Statement for Problem 4, Assignment 9

In Problem 4 the input angular displacement of the engine is given as

$$\theta_e = \Omega t + \epsilon \sin \frac{\Omega}{2} t$$

The corresponding output angular displacement of the propellor has the form

$$\theta_p = \Omega t + \text{Constant} + \psi(t)$$

where $\psi(t)$ is the response to the excitation $\epsilon \sin \frac{\Omega}{2} t$ acting alone.

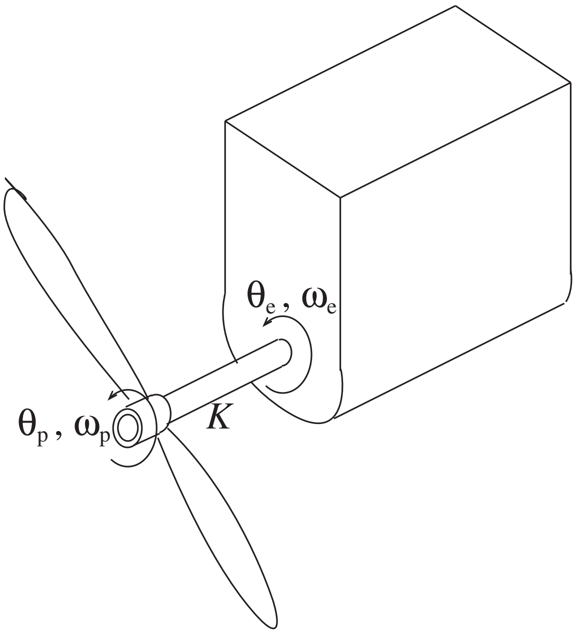

Figure 1: Torsional Vibration of Propellor Shaft

In the original problem statement, attention is erroneously focused on fluctuations in propellor *speed*. It should have addressed fluctuations in the amplitude of the oscillating *angular displacement* $\psi(t)$ of the propellor.

The third sentence of the original Problem Statement should be replaced by "It is observed that the steady state oscillations of the propellor *displacement* $\psi(t)$ at the firing frequency reach a peak amplitude when the engine runs at 2200 rpm.". In part (a), "fluctuations in propellor *speed*" should be replaced by "fluctuations in *angular displacement* of the propellor".