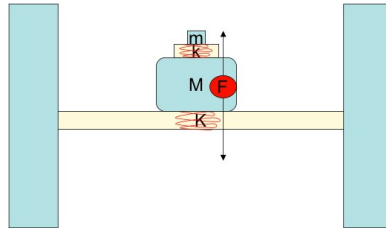


Acoustics Exercise 1. To be returned on Friday 20.3.2009

- (1) It is important to know the compliance K of the electrodynamic loudspeaker to design a proper back cavity. The displacement of the speaker cone is hard to measure, as well as the moving mass M (without breaking the thing apart!), but you can use a measurement to estimate the resonance frequency of the speaker. What will you do and why? (Hint. You could add a small known mass m to the cone...)
- (2) A big motor with mass M is sitting on a floor. The floor is oscillating and causing noise problems when the motor is running. As the motor is running, a vertical back reaction force $F = F \exp(i\omega t)$ is acting onto the body of the motor. Assume that the floor is a vertical string with compliance K .

To reduce the noise, a small mass m is attached on the top of the motor with rubber support k . Choose proper values for the mass m and for the rubber compliance k to eliminate the noise propagating to the structure of the building.



- (3) Calculate the Green function (impulse response) of the 1-dimensional damped harmonic oscillator

$$G(\tau) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \frac{\exp(i\omega\tau)}{-\omega^2 m - i\omega\gamma + K} d\omega$$