

## HOMEWORK 2

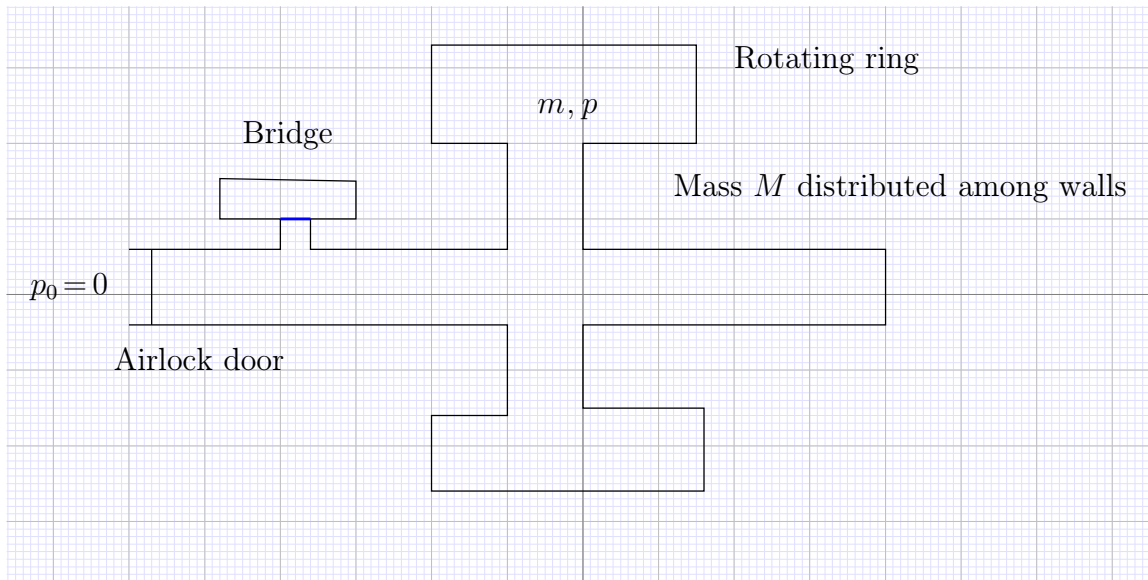
Due date: March 10, 2017, 11:55PM.

Continue the modeling of the *Hermes* spaceship by consideration of the fluid-structure interaction problem.

1. Seal off the bridge compartment through an elastic string that satisfies the equation

$$v_{tt} - c^2 v_{xx} = p(t, x) / \lambda,$$

for transverse displacement  $v(x, t)$ , with  $c$  the elastic wave speed in the string, and  $\lambda$  the linear density of the string.



2. Model the bridge seal as a 2D elastic body under plane strain assumptions that satisfies the Cauchy elasticity equations (see lecture notes and/or LeVeque finite volume book for Cauchy equations)
3. Replace rigid horizontal walls with elastic walls that satisfy the equation

$$u_{tt} - c^2 u_{xx} = 0$$

for longitudinal displacement. The walls are acted upon by the resultant of pressure forces on the vertical walls they are connected to (assumed to be rigid).