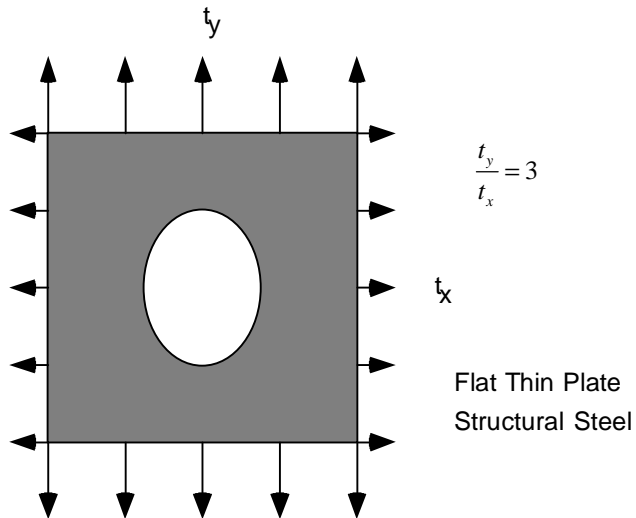## Problems for the Term Project
MEAM 599-06, Winter 1999

1. Find the optimum shape of a hole by enforcing the Mises equivalent stress being constant on the designed surface.

$$\frac{t_y}{t_x} = 3$$

Flat Thin Plate
Structural Steel

2. Find the optimum size and location of the nodal points of a three dimensional frame structure by minimizing the total weight, while the maximum Mises equivalent stress is bounded by a half of the yield stress of a standard structural steel, and the maximum nodal displacement is also bounded by the upper bound, say, 5mm.

Fixed Point

Loading P

Loading P
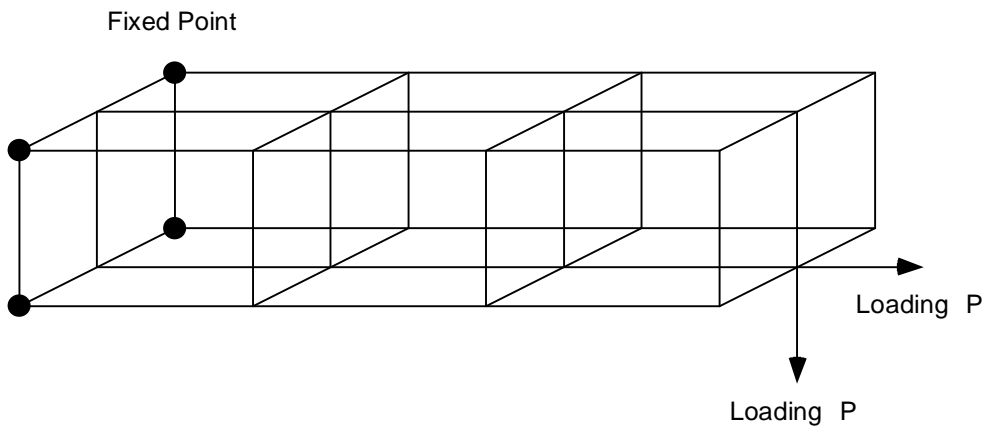
3. Find the optimum cross sectional area of truss members which minimize the mean compliance with the pin-pin supported column buckling load.

Fixed Point

Loading P

Loading P
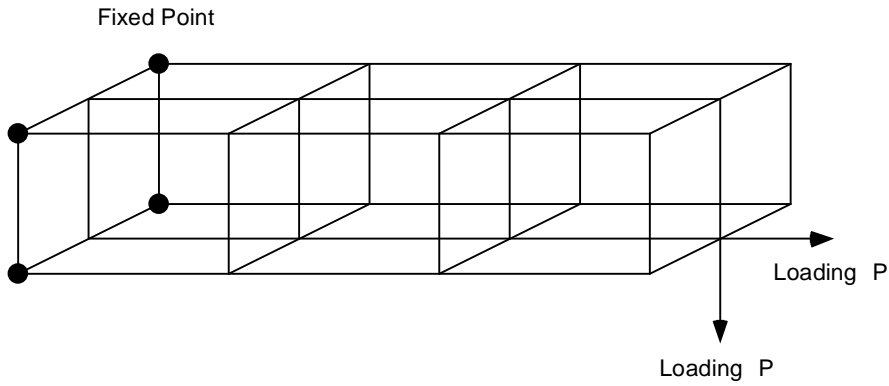
4. Find the optimum Young modulus distribution that maximizes the displacement in the specified direction, while the density of strain energy should be greater than or equal to a specified lower bound. Here, material is assumed to be isotropic, and Poisson's ratio is constant, say, 0.3.

Applied Load P

(input)

displacement (output)
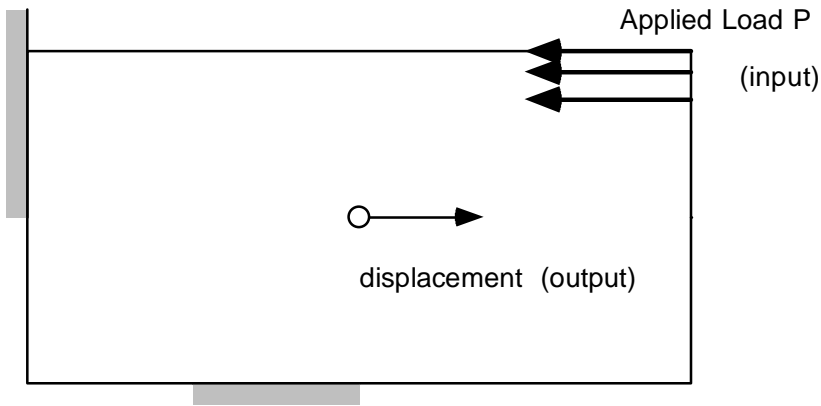
5. Find the optimum Young modulus distribution that provides the constant Mises equivalent stress distribution. The constant value is set up as, for example, 100Mpa.

L=2H

H

R=H/4

t_x

$t_y = 2t_x$

t_y
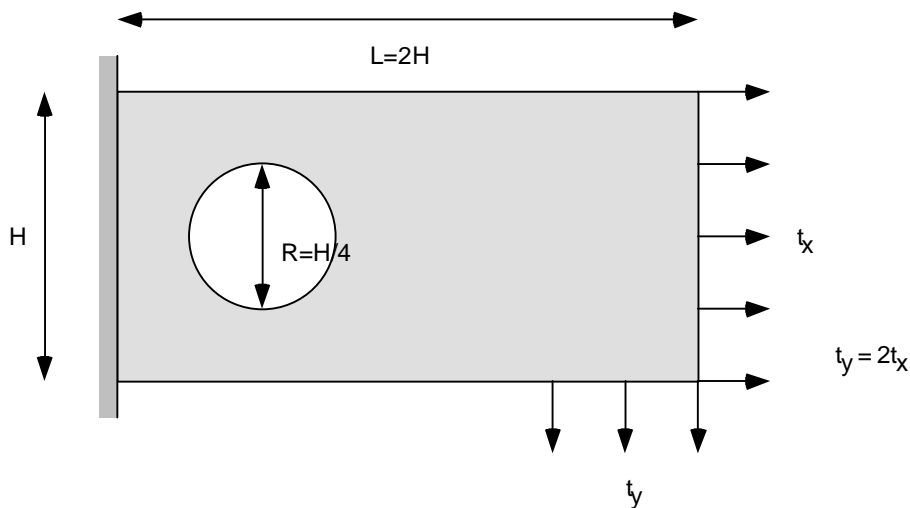
Detail physical dimensions must be set up by yourself.