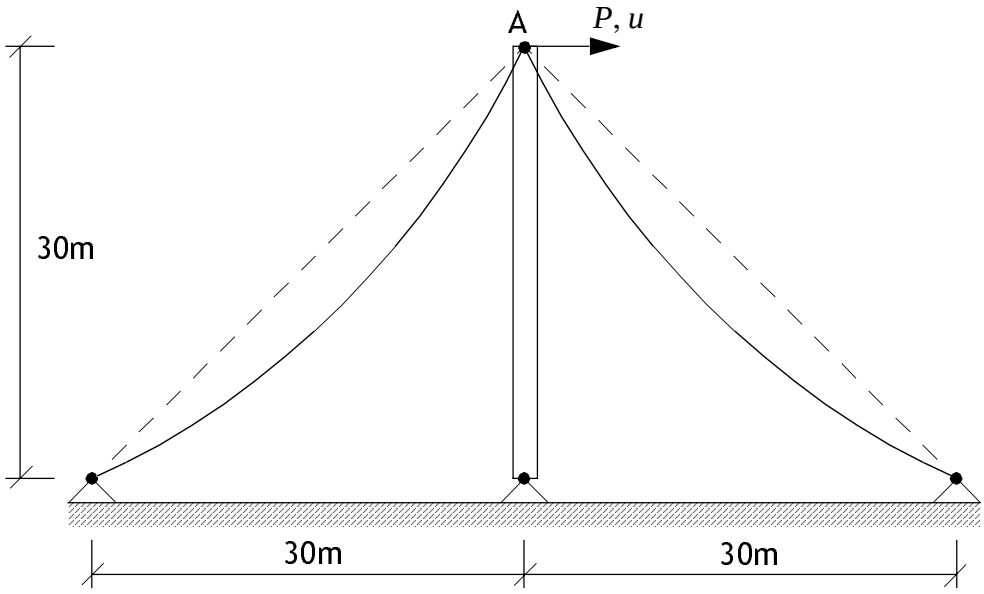
1.571 Structural Analysis and Control
Prof. Connor
Problem Set 4

Problem 4.1

Consider the cable-stayed 2-dimensional structure shown below. The data for each cable is:

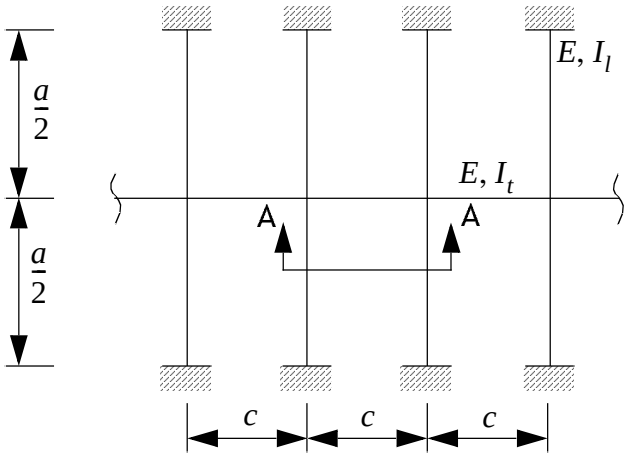
T = 38 kN
w_A = 100 N/m
E = 210 000 MPa
A = 70 mm^2

Suppose a lateral force, P, is applied at point A. Estimate the corresponding lateral displacement, u.

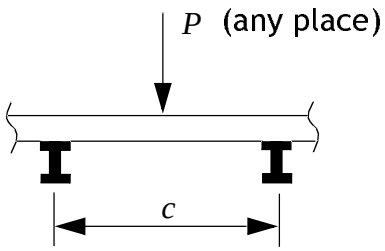


Problem 4.2

Consider a beam supported by cross-members, which are fixed at their ends. Estimate how P is distributed to the cross-members using a beam on elastic foundation model for the "beam" and "cross-member" system. Evaluate the distribution for $a = 8\,\text{m}$, $c = 0.3\,\text{m}$, and $I_t = I_l$



Section A-A



Problem 4.3

Consider a beam of infinite length on an elastic foundation. Obtain the solution for the loading shown.

Illustrate the case where:

k_s = 10^6 N/m^2 (stiffness per unit length)

D_B = 25 x 10^6 Nm^2

a = 30 m