Problem 4.1

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

\[ T = 38 \text{ kN} \]

\[ w_A = 100 \text{ N/m} \]

\[ E = 210,000 \text{ MPa} \]

\[ A = 70 \text{ mm}^2 \]

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 \( I_l = I_t \)

\[
\begin{align*}
\text{Section A-A} \\
P \text{ (any place)} \\
\left\{ \begin{array}{c}
\left\langle E, I_l \right\rangle \\
\left\langle E, I_l \right\rangle \\
c \\
c \\
c \\
\end{array} \right.
\end{align*}
\]
Problem 4.3

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

Illustrate the case where:
\[ k_s = 10^6 \text{ N/m}^2 \text{ (stiffness per unit length)} \]
\[ D_B = 25 \times 10^6 \text{ Nm}^2 \]
\[ a = 30 \text{ m} \]