

Problem M2

A cable (i.e. a rope, string or chain) is a structural member that can only carry axial tensile loads (i.e the tension in the cable at a particular point acts in the direction of the cable at that point) . Nevertheless it can deflect in the transverse direction. The deflection is related to the load that it is carrying and the tension in the cable.

- A flexible cable weighing 10 N/m is stretched between two points at the same level 100 m apart. In addition to its weight it supports a vertical load of 500 N at a horizontal distance of 30 m from one end. The dip (distance below the horizontal) at that point being 1.9 m . Find (approximately) the horizontal component of the cable tension and the dip at midspan.
- If the cable has an effective cross-sectional area of 1000 mm^2 and an effective Young's modulus of 2 GPa , *estimate* the extension of the cable due to the loading in part (a). Would this extension affect the assumptions you made to evaluate the tension in the cable in part (a)?.

