CVE154 Exam 2, Part 3

prepared by Christian Cahig for classes of A.Y. 2024-2025 S1

2024-11-14

Referring to Figure 1, the rigid tripod assembly is subject to a force $\boldsymbol{F} = 4.2\mathbf{i} + 1.7\mathbf{j} - 6.9\mathbf{k}$ N, supported by a ball-and-socket joint at A and by rollers at B and C.

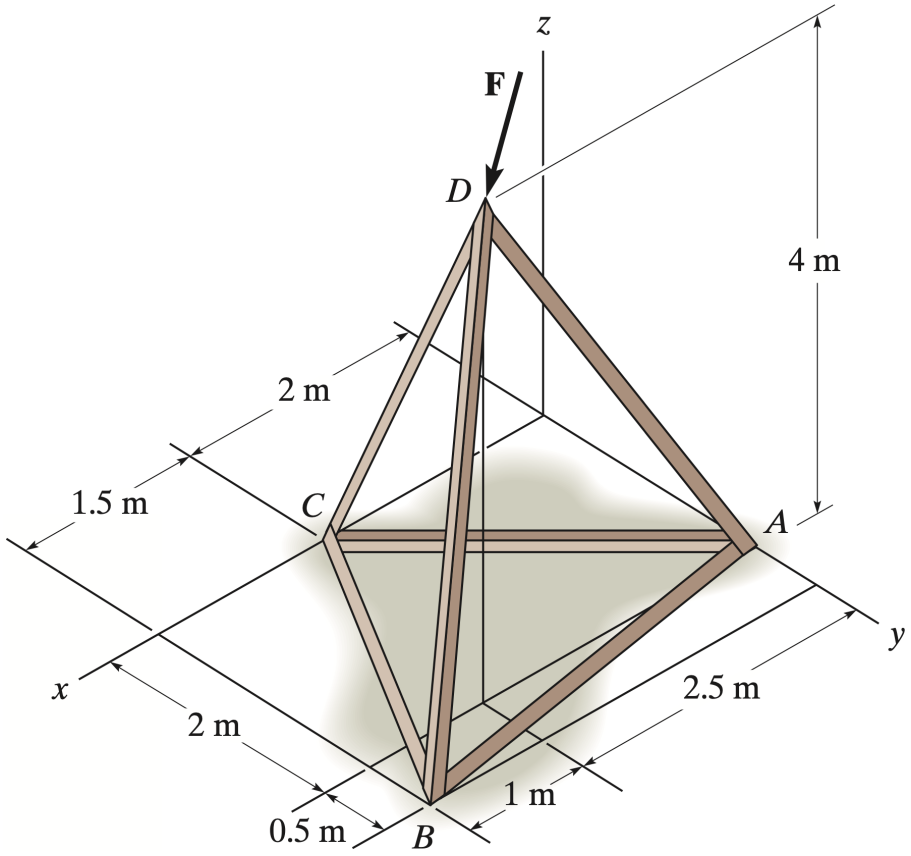

Figure 1 The tripod assembly is supported by a ball-and-socket joint and rollers. The image is a screenshot of the accompanying figure for Problem 4-61 of *Engineering Mechanics: Statics and Dynamics (14th ed.)*, the authorship and copyright of which belong to R. C. Hibbeler.

P1 (15 pt.) Derive a system of linear equations $\boldsymbol{Ax} = \boldsymbol{b}$ where $\boldsymbol{x}$ collects the unknown z-components of the reaction forces. Comment on the solvability of the linear system by making observations on $\boldsymbol{A}$.

P2 (10 pt.) Solve for $\boldsymbol{x}$ via Gaussian elimination. You may use any pivoting strategy.

P3 (15 pt.) Solve for $\boldsymbol{x}$ via LU decomposition. You may use any pivoting strategy.