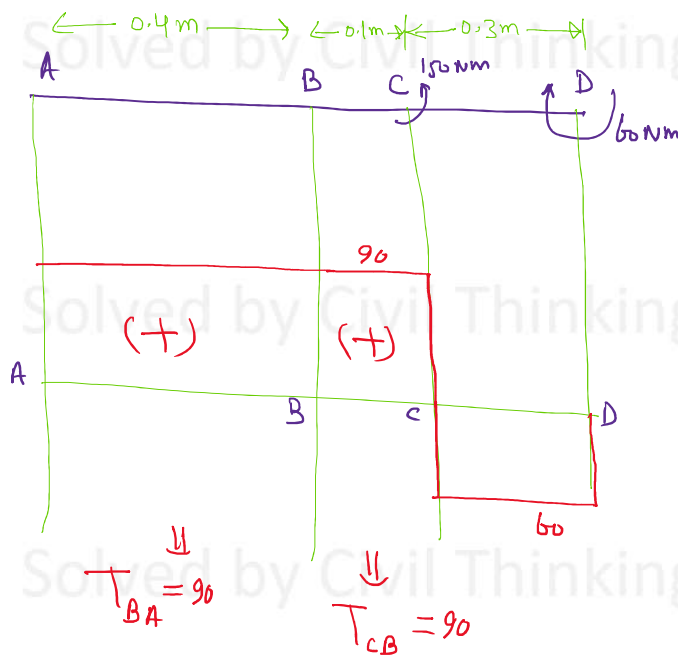
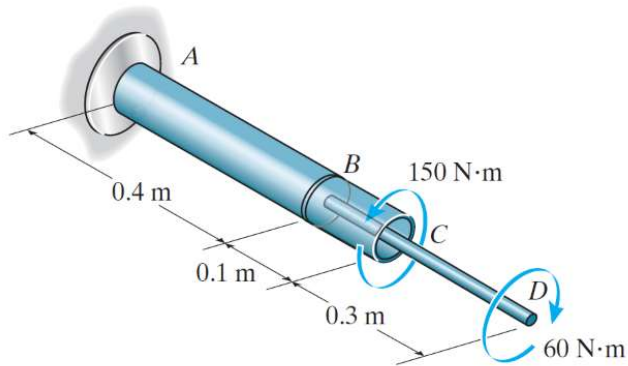


Torsion in Shafts. Question 5-55 Solution

Saturday, 15 March, 2025 09:06 AM

5-55. The assembly is made of A-36 steel and consists of a solid rod 20 mm in diameter fixed to the inside of a tube using a rigid disk at B. Determine the angle of twist at C. The tube has an outer diameter of 40 mm and wall thickness of 5 mm.

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$$\theta_{C/A} = \theta_{C/B} + \theta_{B/A}$$

$$= \left(\frac{TL}{JG} \right)_{CB} + \left(\frac{TL}{JG} \right)_{BA} = \frac{1}{JG} [(TL)_{CB} + (TL)_{BA}]$$

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$$J = \frac{\pi}{2} (0.02^4 - 0.015^4); \quad G = 75 \times 10^9 \text{ Pa [A36 Steel]}$$

$$T_{CB} = 90 \text{ N.m}; \quad T_{BA} = 90 \text{ N.m.}$$

$$\Rightarrow \theta_{C/A} = 0.003958 \text{ radians} = 0.227^\circ$$

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