

A rigid, L-shaped bar BCD is pinned to ground at C. Two circular cross-section elastic members (1) and (2), each having a Young's modulus of E , coefficient of thermal expansion α and diameter d , are connected between the ends of the bar and ground, as shown below. The elastic members and sections of the bar are either vertically oriented or horizontally oriented. A horizontal force P is applied to joint B. In addition, the temperatures of the elastic members (1) and (2) are *increased* by amounts of ΔT and $2\Delta T$, respectively. Following the four steps below, you are asked to determine the stress in each of the elastic members.

1. **Equilibrium.** Draw the free body diagrams (FBD) of member BCD. Write down the appropriate equilibrium equations from your FBDs. Is this system determinate?
2. **Force/elongation equations.** Write down the force/elongation equations for members (1) and (2).
3. **Compatibility.** Write down the appropriate compatibility equation(s) relating the elongations of rods (1) and (2).
4. **Solution.** Solve your equations above for the loads carried by the two members. From these, determine the stress in those members. Write your answers in terms of, at most: P , E , L , α , ΔT and d .

