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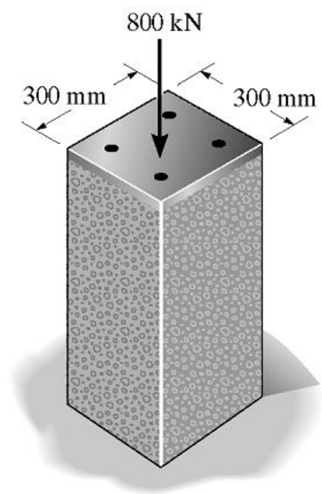
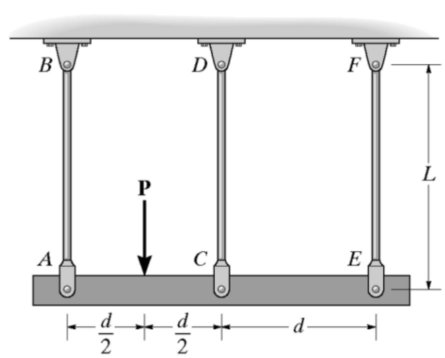
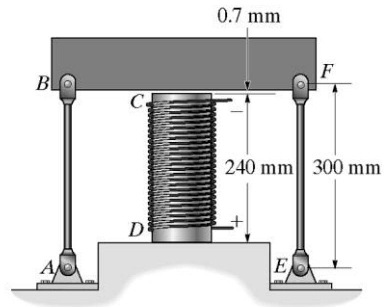
1. The concrete column is reinforced using four steel reinforcing rods, each having a diameter of 18 mm. Determine the stress in the concrete and the steel if the column is subjected to an axial load of 800 kN. E_{st} = 200 GPa, E_c = 25 GPa.



2. The three suspender bars are made of the same material with Young's modulus E and have equal cross-sectional areas A. Determine the average normal stress in each bar if the rigid beam ACE is subjected to the force P.



3. The center rod *CD* of the assembly is heated from $T_1 = 30^0$C to $T_2 = 180^0$C using electrical resistance heating. Also, the two end rods *AB* and *EF* are heated from $T_1 = 30^0$C to $T_2 = 50^0$C. At the lower temperature T_1 the gap between *C* and the rigid bar *BF* is 0.7 mm. Determine the force in rods *AB*, *CD* and *EF* caused by the increase in temperature. Rods *AB* and *EF* are made of steel, and each has a cross-sectional area of 125 mm^2. *CD* is made of aluminum and has a cross-sectional area of 375 mm^2. E_{st} = 200 GPa, E_{al} = 70 GPa, $\alpha_{st} = 12(10^{-6})/^0$C, and $\alpha_{al} = 23(10^{-6})/^0$C.



4. The bar has a cross-sectional area *A*, length *L*, modulus of elasticity *E*, and coefficient of thermal expansion α. The temperature of the bar changes uniformly along its length from T_A at *A* to T_B at *B* so that at any point *x* along the bar $T = T_A + x(T_B - T_A)/L$. Determine the force the bar exerts on the rigid walls. Initially no axial force is in the bar.