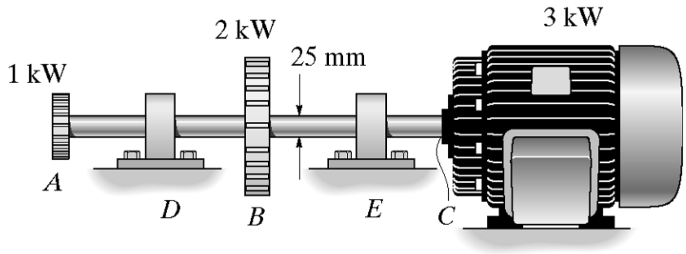
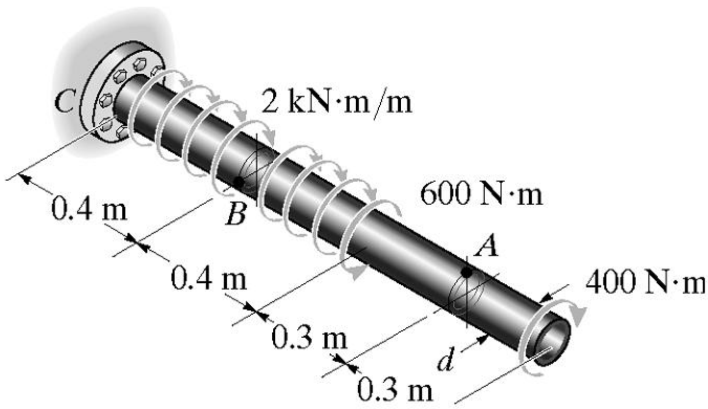
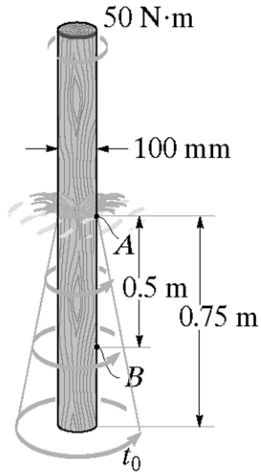
1. The solid steel shaft *AC* has a diameter of 25 mm and is supported by smooth bearings at *D* and *E*. It is coupled to a motor at *C*, which delivers 3 kW of power to the shaft while it is turning at 50 rps. If gears *A* and *B* remove 1 kW and 2 kW, respectively, determine the maximum shear stress developed in the shaft within regions *AB* and *BC*. The shaft is free to turn in its support bearings *D* and *E*.【图示实心钢轴 *AC* 直径为 25 mm，由 *D*、*E* 两处的光滑轴承支撑，并与功率为 3 kW、转速为 50 rps 的电机 *C* 相联，若齿轮 *A* 和 *B* 需分别传递 1 kW 和 2 kW 的功率，试分别求钢轴 *AB* 和 *BC* 段内承受的最大切应力。】



2. The 60-mm diameter solid shaft is subjected to the distributed and concentrated torsional loadings shown. Plot the torque diagram and determine the absolute maximum and minimum shear stresses in the shaft and specify their locations, measured from the fixed end.【图示直径为 60 mm 的实心圆轴受两个集中扭矩和一段均布扭矩共同作用，试画出圆轴扭矩图，求出绝对最大和最小切应力的大小，及其所对应的截面位置。】



3. The wooden post, which is half buried in the ground, is subjected to a torsional moment of 50 N·m that causes the post to rotate at constant angular velocity. This moment is resisted by a linear distribution of torque developed by soil friction, which varies from zero at the ground to t_0 N·m/m at its base. Determine the equilibrium value for t_0, and then calculate the shear stress at points *A* and *B*. which lie on the outer surface of the post.【图示木桩一半埋于地下，在顶端 50 N·m 的扭矩作用下作匀角速旋转运动，若土壤对木桩旋转的反作用扭矩呈线性分布：在地面处为 0，在木桩底端为 t_0 N·m/m，试求维持动平衡所对应的 t_0 值，并求位于木桩外表面的 *A*、*B* 两点所受切应力。】



4. The solid shaft of radius *r* is subjected to a torque *T*. Determine the radius *r'* of the inner core of the shaft that resists one-half of the applied torque (*T*/2). Solve the problem two ways: (a) by using the torsion formula, (b) by finding the resultant of the shear-stress distribution.【图示半径为 *r* 的实心圆轴受扭矩 *T* 作用，试求半径 *r'*，要求 *r'* 内的部分承担的扭矩正好为 *T*/2，试用两种方式求解：(a)扭转切应力公式；(b)对分布切应力积分求合力矩。】