彎曲且預扭曲桿件受彈性支之動態行為

This study formulates the equations of motion and presents the dynamic response for a curved and pretwisted rod with elastic restraints. The effects of slenderness, curvature, torsion, cross section shape, taper, and elastic restraints on natural frequencies and mode shapes of the rod are discussed. Expressions for the kinetic, potential, and elastic restraint energy functions of a curved and twisted rod subject to elastic restraints is derived using Kingsbury's assumptions of centerline displacements and cross section rotations. These expressions are first used to drive the equations of motion and boundary conditions using Hamilton's Principe. The equations of motion are then specialized for various variations of centerline curvature, torsion, cross section shape, and taper along the rod axis. Next, the kinetic potential, and elastic restraint energy functions are used to formulate Rayleigh-Ritz solutions for the mode shapes and natural frequencies of a curved and pretwisted rod with elastic restraints. Effects of slenderness, curvature, torsion, cross section shape, taper, and elastic restraints on the dynamic response for a curved and pretwisted rod are then thoughtfully studied .