

Analysis of Transverse Vibrations in Uniform Beams Subject to Different End Restraints

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Abstract : Free vibration analysis of beams, based on the assumptions of Bernoulli-Euler theory, has been extensively studied. Many research works have focused on the study of transverse vibrations under the application of different boundary conditions where different theories have been applied. The stiffness and mass matrices considered are those obtained by assembling those resulting from the use of the finite element method. The Jacobi method has been used to solve the eigenvalue problem. These well-known concepts have been applied to the study of beams with constant geometric and mechanical characteristics having one to two overhangs with variable lengths. Murphy studied, by an algebraic solution approach, a simply supported beam with two overhangs of arbitrary length, allowing for an experimental determination of the elastic modulus E. The advantage of our article is that it offers the possibility of extending this approach to many interesting problems formed by transversely vibrating beams with various end constraints.

Keywords : beam, finite element, transverse vibrations, end restraint, Bernoulli-Euler theory

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