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Unified Green's functions of forced vibration of axially loaded Timoshenko beam: Transition parameter

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Abstract

The present paper studies the steady-state dynamical problem of an axially forced Timoshenko beam with various boundary conditions, in a systematic manner. In view of the contribution of the axial force to the shear force, the equation of motion available in literature is expressed in a unified manner, by introducing an intrinsic transition parameter. Methods of separation of variable and the Laplace transform are sequentially employed to find the Green's functions. The transverse displacement and the rotation angle of the beam cross section are analytically obtained in terms of elementary functions. The axially loaded Timoshenko beam can be equivalent to a traditional one without axial force. Numerical calculations are systematically carried out

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