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In-Plane Free Vibration Frequencies of Stepped Circular Beams

Timuçin Alp Aslan [1*], Beytullah TEMEL [2] and Ahmad Reshad NOORI [3]

[1] *Çukurova University, Adana, Turkey, taslan@cu.edu.tr*
[2] *Çukurova University, Adana, Turkey, btemel@cu.edu.tr*
[3] *Çukurova University, Adana, Turkey, a.reshadnoori@yahoo.com.tr*

In this study, in-plane natural frequencies of stepped circular beams are presented. The material of the beam is considered to be isotropic, homogeneous and elastic. The effects of shear deformation and rotary inertia are considered in the necessary assumptions and formulations. The obtained canonical form of governing equations is solved numerically by the complementary functions method (CFM) in the Laplace domain. To obtain the natural frequencies of the considered structures the Laplace parameter is replaced with the parameter of free vibration. The 5th order Runge Kutta (RK5) algorithm is applied to solve the initial-value problem based on the CFM. To examine the in-plane free vibration of Timoshenko stepped circular beams a program is coded in FORTRAN. In order to demonstrate the accuracy of the current scheme, present results are compared with those of literature. The accuracy and efficiency of the presented results are observed.

Keywords: Free vibration; Stepped Circular Beams; Laplace Transform.