

NED UNIVERSITY JOURNAL OF RESEARCH

EIGENFREQUENCIES OF GENERALLY RESTRAINED TIMOSHENKO BEAMS WITH AN INTERNAL HINGE

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Volume: **XI**

No: **3**

Pages: **1-18**

Date: **2014**

Abstract:

This paper deals with the free transverse vibration of a Timoshenko beam with an arbitrarily located internal elastic hinge. The ends of the beam were elastically restrained against both rotation and translation. The results are obtained with the exact solution and with an analytical method that consists of a combination of the Ritz and the Lagrange multiplier methods. Both were used to determine free vibration characteristics of the employed beam. In the combined method, trial functions denoting the transverse deflections and the normal rotations of the cross section of the beam are expressed in polynomial forms. In order to verify the accuracy of the developed mathematical model, cases available in the literature have been considered. Results have also been presented for different end and restraint conditions (in the intermediate point) of the beam. In addition, a comparison with a crack model is also provided.

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