

## THE INFLUENCE OF WARPING AND WINKLER-PASTERNAK SOIL ON THE TORSIONAL VIBRATIONS OF THIN-WALLED OPEN SECTION BEAMS WITH GUIDED-END CONDITIONS

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### ABSTRACT

This paper deals with the free torsional vibrations of doubly symmetric thin-walled beams of open section and resting on Winkler-Pasternak continuous foundation. A general dynamic stiffness matrix is developed in this paper which includes the effects of warping and Winkler-Pasternak foundation on the torsional natural frequencies. The resulting highly transcendental frequency equations for a simply supported and guided-end conditions are solved for varying values of warping Winkler and Pasternak foundation parameters on its frequencies of vibration. A new MATLAB code was developed based on modified BISECTION method to solve the highly transcendental frequency equations and to accurately determine the torsional natural frequencies for various boundary conditions. Numerical results for natural frequencies for various values of warping and Winkler and Pasternak foundation parameters are obtained and presented in graphical form showing their parametric influence clearly.

**KEYWORDS:** Dynamic Stiffness Matrix, Winkler-Pasternak Foundation, Warping, MATLAB, Bisection Method