

عنوان مقاله:

Free Torsional Vibration Analysis of Hollow and Solid Non-Uniform Rotating Shafts Using Distributed and Lumped Modeling Technique

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نویسندگان:

A Saghafi - *Department of Mechanical Engineering, Birjand University of Technology, Birjand, Iran*

M .A Azizi - *Department of Mechanical Engineering, Birjand University of Technology, Birjand, Iran*

خلاصه مقاله:

In this paper, the torsional free vibration of solid and hollow rotating shafts with non-uniform tapered elements are investigated. To this end, the exact solution and also transfer matrix for the free torsional vibration of a hollow tapered shaft element with uniform thickness and also solid element are firstly obtained. Then, the natural frequencies are determined based on distributed and lumped modeling technique (DLMT). This technique is similar to transfer matrix method (TMM) but the exact solution is employed to obtain the transfer matrixes of the distributed element, therefore, there is no approximation and the natural frequencies and mode shapes are the exact values. To confirm the reliability of the presented method, the simulation results are compared with the results obtained from the other methods such as finite element method. It is shown that the proposed method provides highly accurate results and it can be simply applied to the complex torsional systems.

کلمات کلیدی:

Torsional vibration, Hollow tapered shaft, Distributed and lumped modeling techniques (DLMT), Transfer matrix method (TMM), Natural frequency

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