SM22L_12934

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Dynamic Instability of a High-Speed Flexible Shaft with a Massive Disc and Follower Load.

Włodzimierz Kurnik, **Jarosław Weronko**

Warsaw University of Technology, Warsaw, Poland

The paper is concerned with transverse flutter instability analysis of a flexible rotating shaft supported as a cantilever beam carrying a massive disc at the free edge. The system is subjected to concentrated follower load exerted on the disc. Such model corresponds to real rotating machinery like turbines or compressors in which medium flow can produce tension or compression in the shaft. The follower load and internal dissipation generate dynamic bifurcations of flutter type. A discrete-continuous model of the system is considered in which attention is paid mainly to the gyroscopic effect and the influence of the massive disc on the shape functions for the continuous shaft. The near-critical behaviour of the system is analysed as well under assumption of geometric system non-linearity. It is shown that the gyroscopic effect can dramatically change the flutter scenario of the system.

View the extended summary