World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:10, No:02, 2016

The Nonlinear Dynamic Response of a Rotor System Supported by Hydrodynamic Journal Bearings

Authors : Amira Amamou, Mnaouar Chouchane

Abstract : This paper investigates the bifurcation and nonlinear behavior of two degrees of freedom model of a symmetrical balanced rigid rotor supported by two identical journal bearings. The fluid film hydrodynamic reactions are modeled by applying both the short and the long bearing approximation and using half Sommerfeld solution. A numerical integration of equations of the journal centre motion is presented to predict the presence and the size of stable or unstable limit cycles in the neighborhood of the stability critical speed. For their stability margins, a continuation method based on the predictor-corrector mechanism is used. The numerical results of responses show that stability and bifurcation behaviors of periodic motions depend strongly on bearing parameters and its dynamic characteristics.

Keywords : hydrodynamic journal bearing, nonlinear stability, continuation method, bifurcations
Conference Title : ICTFD 2016 : International Conference on Turbomachinery and Fluid Dynamics
Conference Location : Paris, France
Conference Dates : February 22-23, 2016