EXPERIMENTAL STUDY OF THE ROTOR RIG WITH A BUBBLE INSERTED INTO THE BEARING CLEARANCE

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ABSTRACT

This paper presents the experimental results of nonsynchronous perturbation testing of a rotor rig with a fluid-lubricated bearing. Insertion of an air bubble into the bearing clearance affected the dynamic characteristics of the rotor system. Based on the Bently-Muszynska rotordynamic model, the Dynamic Stiffness was calculated and the modal parameters were identified. Comparison of the modal parameters between the corresponding sets, with and without a bubble, was performed. The influence of the journal eccentricity ratio, oil supply pressure, and unbalance value on the modal parameters was investigated. The experiments proved the concept of fluidic inertia effect by demonstrating that the presence of a bubble reduced the circumferential flow and observed fluidic inertia effect associated with the fluid-film rotation. **The strong reduction in the shift of Direct Dynamic Stiffness parabola observed as result of a bubble insertion proves that this shift is originated by the fluid inertia effect, not by gyroscopic effect, or Coriolis effect.**

Keywords: journal bearing, bubble, Dynamic Stiffness, fluidic inertia effect.