

Experimental Determination of Rotor Bearing Parameters and Fluid Inertia Effect Using Nonsynchronous Perturbation Testing

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ABSTRACT

Nonsynchronous perturbation testing provides a powerful tool for identifying the rotor bearing parameters of machinery supported by fluid bearings. An experimental test rig equipped with an externally pressurized fluid bearing and a nonsynchronous perturber identified the following rotor bearing parameters; Direct and Quadrature Dynamic Stiffness, modal damping, fluid circumferential average velocity ratio, modal mass, fluid inertia effect, and bearing attitude angle. The experimental results verified the mathematical model. Subsequent tests showed that a cavitated fluid film produces significantly less fluid inertia effect on the rotor than non-cavitated trials.