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Numerical Modelling Based on Large-Angle Oscillation Theory in Determining the Rotating Inertia of a Rotor Subjected to Frictions

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Abstract

This research discusses a numerical method used for determining the mass moment of inertia of a rotor that has been validated through laboratory tests. In this technique, the rotor is considered as a pendulum where an additional mass is mounted at the outskirt underneath the rotor. The equation of motion of this pendulum is then established, based on the oscillating unbalanced rotor, and the magnitude of the inertia is extracted from the free oscillating response. Nonlinear theory of pendulums with large-angle oscillation is applied to estimate the mass moment of inertia. While this mathematical theory considerably improves the result, the dry friction acting on the bearing of the rotor still creates a significant inaccuracy. This research proposes a resolution to alleviate this erroneous calculation by applying a remedy factor in interpreting the nonlinear response of the pendulum.

Keywords: Large amplitude oscillation, rotating inertia, coulomb damping friction

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