DYNAMICS OF A HORIZONTAL SINGLE DISK JEFFCOTT ROTOR

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ABSTRACT

Rotors are common mechanical elements of most machineries. Mass imbalance is common in all rotating machinery which may often lead to dangerous vibrations that are deleterious to the machine set up. The current trend of greater power density demands higher rotational speeds and this requirement calls for a thorough understanding of rotor dynamics since disturbing actions associated with imbalance increase with speed. The present research considers a two dimensional isotropic and flexible horizontal rotor with a symmetrical disk where, amongst others, the gravity force and the often disregarded Coriolis force are also considered. As the rotor passes from subcritical to supercritical state, its dynamic response shows many striking irregularities, reminiscent of chaos as observed in some nonlinear systems.

KEYWORDS: Jeffcott rotor, Phase-Plane Trajectory, Supercritical State, Instability.