

New Theory of Rotor Dynamics: Rotor Dynamics with Moment Unbalance

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The resume: In the given paper of a basis of the new inertial theory of dynamics of a rotor are declared. The special attention is given to features of behavior of a rotor with moment unbalance. The inertial theory considers any change of the moment of inertia of a rotor as disturbing factor, if change of the moment of inertia of a rotor took place because of displacement or a deviation of a geometrical axis of a rotor from an axis of rotation. According to the theory, the disturbing factor resists with rotation of a rotor. In the given paper of force and the moments, acting on a rotor with moment unbalance, are described. The circuit of forces and the moments, acting on a rotor, is created. On the basis of the circuit of the equation of dynamics of a rotor are received. It shows, that the equation of dynamics of a cylindrical rotor differs from the equation of dynamics of a disk rotor. Accordingly, features of rotation of a cylindrical rotor differ from features of rotation of a disk rotor. The analysis of features of rotation of a disk rotor is executed. The analysis of features of rotation a cylindrical rotor is executed. The special attention addresses on questions of physics of process of rotation of a rotor.

Keywords: Dynamics, Rotor, Unbalance, Shaft, Support

1 Introduction

From positions of the inertial theory, influence of a static unbalance on dynamics of a rotor is considered^[1]. However, the moment unbalance influences dynamics of a rotor also. In general, static unbalance and moment unbalance influence dynamics of a rotor simultaneously. We name this complex kind of a unbalance a dynamic unbalance. However, for the decision of problems of dynamics of a rotor with a complex dynamic unbalance it is important to understand features of rotation a rotor with moment unbalance. The known "oscillatory" theory of dynamics of rotors could not receive the equation of dynamics of a rotor with moment unbalance.

The oscillatory theory allows to receive the equations of dynamics of a rotor only in case there is a displacement of the center of mass from a geometrical axis.

2 The Object of a Researches and System of a Coordinates.....	6.1 Subcritical a mode of rotation of a rotor.....
3 Forces and Moments, Acting on the Rotor.....	6.2 A transitive mode of rotation.....
4 The Equations of Dynamics of the Rotor.....	6.3 A supercritical mode of rotation of a rotor..
5 The Corners Determining the Directions of Action of Forces and the Moments.....	7 The Equations of Dynamics of the Disk Rotor.....
6 The Features of Dynamics of the Cylindrical Rotor.....	8 Summary.....

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