

NEW ROTARY MOTION TRANSMISSION AND STABILIZATION DEVICES

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To connect rotors, and to transmit and stabilize rotary motion new rotary motion transmission and stabilization devices (RMTSD) were developed. They include the rings which deform axially, radially and at an angle, as well as the radial segments, etc. with joined concentrated inertial, dissipative and flexible elements. RMTSD design schemes are copyrighted and covered by the patents of USA, England and Germany.

Classification of the RMTSD devices is performed according to the following characteristic features: dynamic characteristics, type of elastically creeping elements, peculiarities of design elements, type of fastening, materials, etc.

The classification presented allows us to develop lots of constructions of new RMTSD of this type.

Key words: transmission, stabilization devices, coupling, vibration dampers, clutch

1. Introduction

The rotor system consists of many synchronously rotating links. Due to shafts misalignment, of the links non-balanced parts, manufacture and assembly errors and variation of power supply, the links rotate irregularly. The above factors cause an increased dynamic load in machines and mechanisms, which gives rise to rotary vibration. When summed, these factors reach rather high values. For example, in mighty pumping stations of oil fields a gear shaft misalignment reaches 2–4 mm in the radial direction and up to 10 mm in the axial direction.

The research was carried out with the aim of decreasing rotary vibrations and the forces which provoke them. One of the most effective ways of decreasing vibrations is an improvement of structural elements of machines and their replacement with structures resistant to vibrations. For this purpose, effective RMTSD in the form of various clutches and vibration dampers can be used. Vibration protection in coupling devices manifests itself as suppression of vibration of constituent links of the elements [1, 2, 3].

Lately, two ways have been used to avoid undesirable harmful vibrations, i.e. the development of devices with low activity vibrations and installation of special structural units which suppress and absorb vibrations in the machines.

In the rotor systems, flexible clutches with non-linear characteristics are commonly used. The clutches used up to now do not completely satisfy the vibration protection requirements. They poorly suppress vibration and impacts. At present, new clutch structures, the action of which is based on interaction between the forces of rotating masses and those of flexible elements, are worth special attention. Due to this interaction, the radial stiffness of the shaft

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