

513. Dynamic hydroelastic centrifugal couplings

L. Zubavičius

Vilnius Gediminas Technical University, Lithuania

E-mail: *leonas.zubavicius@vgtu.lt*

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Abstract. The operational principle of dynamic hydroelastic centrifugal couplings is discussed in this paper. An experimental setup for testing dynamical characteristics of the coupling is developed, dynamical properties of the coupling are tested. It is shown that hydroelastic elements can considerably improve operational characteristics of the coupling, especially if transmitted vibrations are to be damped.

Keywords: centrifugal coupling; hydroelastic element; vibration damping.

1. Introduction

Dynamical hydroelastic centrifugal couplings can be used in high-speed power drives when shafts are coupled to transmit torque and to damp oscillations and dynamic loads at the same time, in particular, in drives with wide range of rotational frequencies to increase damping ability in required frequency band of protection against vibrations.

Fig. 1 presents the general view of the dynamic hydroelastic centrifugal coupling; Fig. 2 gives the sectional view a-a of Fig.1; Fig. 3 depicts the general view of the coupling with weights located outside of the coupling. The coupling is composed of driving half-coupling having the hub 1 with radial butts, and the driven half-coupling having the hub 4 and the disc 5 with lugs 6 and in these lugs there are formed T-shaped caves each having two interconnected tangentially located bellows and one radial bellow filled with magnetic fluid. The vibration sensor 19 is located on the hub 1 of the driving half-coupling and linked to the input of the electronic block of frequency damping-control. The output of the sensor is linked to the throttles magnetic coils 10 of which are located in radial branches of T-shapes caves above bellows. Because of changes of magnetic flux, the viscosity of magnetic fluid is changing and the stiffness of the coupling is changing accordingly.

2. The construction of hydroelastic centrifugal couplings

The hydroelastic centrifugal coupling is composed of driving half-coupling having the hub 1 with four radial butts 2 in form of a cross. Bearing pins 3 are firmly fixed on the ends of butts 2 and are perpendicular to the planed of butts. The driven half-coupling is made in form of the hub 4 together with disc 5 with opposed lugs 6 and in these lugs there are formed T-shaped caves. There are two bellows 7 located in tangential branches of the caves and one bellow 8 located in radial branch of the caves. Bellows 7 and 8 are interconnected by means of T-shaped pipelines 9 and are filled with fluid medium which is implemented in form of magnetic fluid.