Abstract ID 1018

OPTIMAL DESIGN OF ADAPTIVE TOOTHED VARIATOR (CVT)

Konstantin Ivanov

Almaty University of Power Engineering and Telecommunication, Institute of Mechanics and Machine Science of MON RK, Kazakhstan
ivanovgreek@mail.ru

Keywords: toothed variator,force adaptation,test-bed,technique of testing.

Abstract: The adaptive toothed variator represents the planetary gear mechanism with constant engagement of cogwheels and with the variable transfer ratio. The variator is self-regulated mechanism and it works without a control system. Basic difference of a gear variator is the mechanism has two degrees of freedom and only one input. Definability of motion provides the planetary four-bar closed contour creating additional power constraint with circulation of energy. The variator is created on the basis of a discovery of Professor Ivanov K.S. «Effect of force adaptation in mechanics». The essence of the discovery is a planetary kinematic chain with two degrees of freedom in which cogwheels form the mobile closed contour, adapts for variable loading by an independent regulation of motion speed of cogwheels in a contour under the influence of loading. For creation of gear variator it is necessary to use brand new principle of act of the mechanism providing the variable transfer ratio. This principle of act is based on energy circulation in the kinematic chain with two degree of freedom. Energy circulation is provided with the toothed wheels forming a mobile closed contour placed between input and output links of a mechanism. Intensity of circulation of energy depends on variable output loading. This key property of the closed contour defines additional constraint which will neutralize superfluous mobility of the closed contour. As a result the variable transfer ratio is provided with variable output loading. Thus the gear variator will provide not only the variable transfer ratio but also adaptation to a variable load. Adaptation is brand new property of the mechanism allowing to work without a control system. The gear variator is the adaptive self-controlled mechanism. The purpose of the present work to create the optimum design of an adaptive toothed variator performing both necessary and sufficient conditions of adaptation and independent reliable start. The basic theoretical regularities of creation of a gear variator, the description of a development type of a variator and the test-bed, technique of conducting of tests and results of tests of the adaptive gear variator are presented. The adaptive gear variator is the optimal on all parameters highly effective self-controlled connecting gear which can be used for machines with variable technological resistance in all branches of engineering from motor industry to a robotics.