DYNAMIC OF THE NON-HOLONOMIC ROTATING MACHINERY WITH VARIABLE SPEED DRIVES

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ABSTRACT

Transmission systems, with a changeable transmission ration, are involved in a lot of complex mechanical systems. Different kinds of mechanical variable speed drive as non-holonomic system are part of complex transmissions. They are used for changing speed in agricultural machines, cutting machines the cable, carpet and paper industries, mining machines, account machines, etc. Seeing this large use of mechanical variations in industry, the aim of this paper is to give us answer about the dynamic behaviour of a general example of this class of transmissions as nonholonomic mechatronics system. These mechanical systems are non-holominc, because the connections are differential. In variators the constraints are described by differential equations with which it is not possible by integration to deduce geometric characteristics. This is the basis of non-holonomic mechanics and gives the difference from holonomic mechanics where are all connections have geometric characteristic and there are no limits of speed and acceleration for the system. In this paper a frictional variable speed as mechatronic transmission system with discs and regulator will be analyzed. The non-holonomic connections exist at the points of the physical contact between discs. To this system regulator for regulation of the variable transmission relation between input and output elements is added. A damper is added for motion stabilizing. During dynamical analysis Appell`s equations will be used. As a result differential equations of motion are obtained. They describe the mechanical non-holonomic system. In many cases it is not possible to solve these differential equations analytically, so they must be solved on computers using numerical methods. In this way, we are getting an answer to a dynamically and kinematics behavior of mechanical systems under the give us the answer to a working stability a system being observed.