SM17S_11352

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Selected Problems of Discrete-Continuous Mechanical Systems with Local Nonlinearities

Amalia Pielorz

Kielce University of Technology, Kielce, Poland

The paper concerns dynamic investigations of nonlinear discrete-continuous systems representing various elements of machines and mechanisms. Such systems consist of rigid bodies connected by means of elastic elements which are torsionally, longitudinally or transversally deformed, and the classical wave equation is used for the description of their motion together with the solution of the d'Alembert type. Nonlinearities in the systems are of a local type and have softening characteristics. Two sets of nonlinear functions are proposed for the description of local nonlinearities, including the polynomial of the third degree and irrational functions. The determination of displacements and strains in arbitrary cross-sections of the elastic elements is reduced to solving nonlinear equations with a retarded argument. Exemplary numerical results are presented for a multi-mass torsional system and for a single gear transmission. It is shown that certain functions have some restrictions for their application.

View the extended summary