**Leshchenko, D.D.**

**Time-optimal damping of rotations of a rigid body with internal degrees of freedom with respect to speed.** (English) **Zbl 0939.70513**

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Summary: We consider the problem of damping of rotations of a free rigid body, carrying components with both distributed and lumped parameters, optimal with respect to speed. It is assumed that the body contains a spherical cavity, filled by a liquid of large viscosity, and a mobile mass point connected to the body by an elastic linkage with a quadratic dissipation. It is assumed that the body is dynamically symmetric in nondeformed state, and the mass lies on the axis of symmetry. We determine optimal control law in the form of synthesis for damping of rotations of the rigid carrier body. It is assumed that the module of kinetic moment diminishes to zero in a finite time period according to this law. By numerical integration of the equation for the nutation angle, we show that the vector of kinetic moment of the body in the coordinate systems connected with nondeformed body approaches the axis of the maximal moment of inertia.

**MSC:**

70Q05 Control of mechanical systems (general mechanics)

70E99 Dynamics of a rigid body and of multibody systems

76D99 Incompressible viscous fluids

**Keywords:**

distributed and lumped parameters; spherical cavity; liquid of large viscosity; mobile mass point; elastic linkage with quadratic dissipation;optimal control law; kinetic moment; numerical integration