Dynamic damping of forced vibrations of gyroscopic system by damper with liquid flywheel

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In recent years, liquid dampers are widely used in spacecraft for damping angular vibrations. Damping of the angular vibrations of gyroscopic systems by the use of a liquid damper has so far not been studied sufficiently. In this case, in order to increase the efficiency of the damper, it is necessary to optimize its parameters. In this article, we consider the dynamic damping of forced oscillations of a uniaxial gyrostabilizer by a damper with a toroidal cavity completely filled with a viscous liquid. An integro-differential equation describing the oscillations of a gyroscopic system is obtained. A new approach to optimizing the parameters of a liquid damper is proposed. The expression for the optimum coefficient of viscosity of a liquid is found. The results obtained can be used in the design of a liquid damper not only in gyroscopic instrumentation, but also in other areas.

Keywords: *dynamic damper, Forced vibration, gyro system, fluid flywheel, viscous fluid, toroidal cavity*

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