Russian Mathematics 2012 vol.56 N2, pages 50-55

The optimal quasi-stationary motion of a vibration-driven robot in a viscous medium

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Abstract

We consider a rectilinear quasi-stationary motion of a two-mass system in a viscous medium. The motion of the system as a whole occurs due to periodic movements of the internal mass relatively to the shell. The problem is to describe the law of motion of the internal mass that provides the minimum energy consumption with a specified average velocity of the shell. We propose an algorithm for solving the problem with any law of the resistance of the medium. We obtain the energy-optimal law of motion of a spherical shell in a viscous liquid. © 2012 Allerton Press, Inc.

http://dx.doi.org/10.3103/S1066369X12020065

Keywords

Energy consumption coefficient, Optimal control, Vibration-driven robot