
Free axisymmetric oscillations of two-layered liquid with the elastic separator between layers in the presence of surface tension forces

© A.A. Pozhalostin, D.A. Goncharov

Bauman Moscow State Technical University, Moscow, 105005, Russia

In operation, the main engine boosters and other space vehicles in view of the long-term passive sectors, during which the conditions of microgravity were implemented, to avoid emergency situations to ensure the uninterrupted supply of components in the intake device for this purpose are widely used semi-capillary phase separator to ensure continuity of the components at their submission to the intake device. In this regard, it is an interesting task to analyze the dynamics of the phase separator. The boundary value problem can be considered as a model for analyzing the dynamics of the upper stage booster on the passive phase. Consider the exact analytical solution of the boundary value problem of small oscillations of the free axisymmetric two-layer fluid with an elastic divider between the layers in the presence of surface tension forces. In solving the boundary value problem, we obtain a transcendental frequency equation, the left of which is a meromorphic function. The elements of this equation are rapidly converging series.

Keywords: *boundary value problem, the separator, the equation of Laplace, Cauchy — Lagrange integral.*

Pozhalostin A.A. (b. 1940) graduated from Bauman Moscow Higher Technical School in 1963. Dr. Sci. (Eng.), Professor of the Department of Theoretical Mechanics named after Professor N.E. Zhukovsky at Bauman Moscow State Technical University. Author of over 150 publications in the field of hydroelastics. e-mail: a.pozhalostin@mail.ru

Goncharov D. A. (b. 1988) graduated with honor from Bauman Moscow State Technical University in 2011. Graduate student of the Department of Theoretical Mechanics named after Professor N.E. Zhukovsky at Bauman Moscow State Technical University. Specializes in the field of fluid dynamics and the dynamics of spacecraft. e-mail: goncharov@bmstu.ru
