

EFFECTS OF NONLINEAR CHARACTERISTICS OF BELLOWS ON PARAMETERS OF CAVITATION SELF-OSCILLATION UNDER COMBINED LONGITUDINAL OSCILLATION OF LINE STRUCTURE AND FLUID

The paper examines the combined longitudinal oscillation of the feed line structure of liquid rocket engines and the fluid considering nonlinearities of an elastic characteristic of the bellows. The limitations of the compression stroke at the expense of coupling near corrugations and the extension stroke at the expense of tightening devices are considered as nonlinearities of the elastic bellows characteristic. The aim of the research is to study the effects of the above nonlinearities of the elastic characteristic of the bellows on parameters of the cavitation self-oscillation under the combined longitudinal oscillation of the line structure and the fluid. It is shown that a manifestation of nonlinearities of the elastic bellows characteristic depends on a double amplitude of displacements of the line structure. As soon as the line structure displacement reaches its peak (when an elastic characteristic of the bellows rises steeply), the mid-position of the bellows displaces in the oscillating circuit of the line structure and the longitudinal oscillation is provided essentially with a more limited double amplitude. It is found that various average pump-inlet pressures result in the double amplitude of parametric values which demonstrate either the absence of the nonlinearity of the elastic characteristic of the bellows or they are close to values in the absence of interactions between the line structure and the fluid.

Keywords: *liquid rocket engines, cavitating pumps, cavitation oscillation, combined longitudinal oscillation of fluid and line structure, nonlinearities of bellows.*

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