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SEMIEMPIRICAL TECHNIQUE FOR DETERMINING COEFFICIENT OF LIQUID INERTIA RESISTANCE DUE TO INVERSE FLOWS AT INLET OF CETRIFUGAL

The paper deals with return flows at inlet of centrifugal inclined Archimedean screw pumps of liquid rocket propulsions (LRP) affecting the LRP dynamic characteristics. At present experimental dependencies of fluid oscillation frequencies of LRP supply lines on pump inlet pressures derived on trials with two widely disparate lengths of supply pipes but under invariant conditions of the pump operation by a flow rate and rotation speed of the pump shaft are being used to determine the coefficient of fluid inertia resistance due to return flows at inlet of centrifugal Archimedean screw pumps (response rate coefficients for return flows). The paper purpose is to develop a new alternative experimental and calculated technique of determination of the response rate coefficient for return flows, based on the solution of the fluid motion through the supply pipe with various coefficients of response rate of return flows. The unknown value of the response rate coefficient for return flows conforms to an excellent correlation between experimental and calculated time dependencies of the pump inlet flow rate. The dependency of the response rate coefficient for return flows on the flow coefficient derived by the proposed technique as a result of tests of seven centrifugal inclined Archimedean screw pumps is close to an analogue dependency derived earlier by another technique and experimental data. This clearly shows assurance of the results obtained.

Keywords; inverse flows, centrifugal inclined Archimedean screw pump, liquid rocket propulsion systems, inertial coefficient of inverse flows, feed pipe.

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