

## SPACE PROPULSION SYMPOSIUM (C4)

Poster Session (P)

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LOX-KEROSENE LPRE WITH SUPPLY OF POLYMER ADDITIVES TO REDUCE HYDRO LOSSES  
IN FUEL LINES (ADDITIONAL STUDY)**Abstract**

Experimental studies to improve the energy efficiency of existing liquid propellant rocket engines (LPRE) and launch vehicles (LV) by improving fluidity of components of liquid propellant using high-molecular additives are continue at NPO Energomash. The possibility of the use of polymers of higher alpha-olefins of linear structure with ultra-high molecular mass of about 107, as an alternative to polyisobutylene as the additive to the rocket fuel as kerosene for the reduction of hydrodynamic losses in the fuel line of LPRE is reviewed in this paper. Comparative experimental dependences of the coefficients of the hydrodynamic friction from the Reynolds number in flow of solutions of polyisobutylene and copolymer 1-hexene with 1-decene of different concentrations in pipes of different diameters are presented. The value of the maximum reduction of friction in the solutions of both polymers is same (approximately 65). The need for measures to transfer the many systems of propulsion units of LV and ground systems of storage and refueling for work with a new component of propellant (additives) will be eliminated at location of the tank with a concentrated solution of polymer in fuel in engine composition. All technical problems to solve because of introduction of new hydrocarbon rocket fuel with additive of polymers of higher alpha-olefins for space launch-vehicles are limited only by the design of LPRE.