

SPACE PROPULSION SYMPOSIUM (C4)
Propulsion Technology (3)

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DEVELOPMENT OF FUEL LEAKAGE DETECTION SENSOR IN SPACE PROPULSION SYSTEM

Abstract

Due to the lack of simple, reliable, cheap small flow sensors numerous internal combustion engines are usually not equipped with the technical means to continuously implement appropriate control of leakages in space vehicles. Traditional technical solutions for measuring small instantaneous fuel consumption are difficult because of the relatively high cost, bulkiness, extreme operating conditions, low reliability. In addition they introduce distortions in the spatial geometry of fluid flow in the pipeline. Besides, the significant dimensions of such sensors makes them absolutely unusable for one of the most promising development of modern micro-space i.e. micro satellites. The physical principle of measuring the velocity of dielectric liquid passing through a capacitive sensor is studied, which is essential for the construction of a novel small sized, high sensitivity and low cost capacitive flow meter. In order to test this method, a pilot plant was established, measurement taken and a relationship between fluid flow and changes in the discharge period of the measuring Capacitor was established. The fundamental principles of dielectric flow, experimental procedures, results obtained, study of the effects of dielectric absorption and conductivity of hydrocarbons fluids (white spirit), how these situations affect the accuracy of measurements will be presented in this paper. A model sensor with a high sensitivity, measuring rates of flow up to 0.03ml/s was developed.