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CONCEPTION RESEARCH ON A PRESSURE POSITIVE FEEDBACK PULSE THRUSTER

Abstract

In this paper, an innovative conception about a Pressure Positive Feedback Pulse space Thruster(PPFPT) is proposed. The principle of the PPFPT is that, by using the combustion gas in the thruster chamber to drive a special piston type pump directly, a chamber pressure and pump supply increase positive feedback effect is formed, and the thruster chamber pressure can reach to a very high level until the propellant in the piston type pump be consumed, thus the thruster operates in a high pressure pulse mode periodically,and a much higher specific impulse can be obtained. Since it is no need to supply high pressure for the propellant filling of the piston pump,the PPFPT can operate with very low inlet pressure, so that the weight of the propellant tank can be much lighter,and much less volume of pressured gas is needed. The detail principle of the PPFPT and its operating process are discussed. Theoretical calculations for a 3000N thrust level hydrogen peroxide and kerosene propellant PPFPT are given in this paper. The result shows that a specific impulse up to 320s can be obtained with a frequency about 80Hz and a chamber pulse pressure of 26Mpa. This PPFPT,along with a 100N hydrogen peroxide catalytic decomposition monopropellant PPFPT,are under developing in Northwestern Polytechnical University in China.