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NOVEL PROPELLANT FEED SYSTEM FOR CHEMICAL IN-SPACE PROPULSION

Abstract

Propulsion system of a satellite makes up for a major portion of the satellite mass and volume. It contributes to the satellite mass not just by the propellant and corresponding components but also by the structure employed to house it. Thus, a small reduction in size of the propulsion system would then lead to significant mass reduction.

Amongst the components the feed system takes up considerable volume and we attempt to reduce it appreciably. Our scheme involves use of high density chemicals inside the propellant tank that would react to generate the pressuring gas whenever required, instead of carrying pre-pressurized gas in a separate tank or by blow-down approach which suffers a performance penalty as the pressure in the tank reduces while in operation. Various chemical combinations have been tested and results have been used to come up with the optimum mixture and corresponding component design. Our design approach is to make the system simple and easy to incorporate with the rest of the pre-existing technology.

The system has been developed by experiments, the methodology of the same, complete working of the system, results of the experiments and comparison with conventional approaches and the various chemical combinations tested has been provided.