Abstract

In this paper, a new method and modern for Preliminary design and optimization mass turbopump in a liquid propellant rocket engine (LPRE) using the gradient algorithm has been developed. The cycle type of LPRE is open cycle and configuration of turbopump feed system consists of an impulse Turbine at the end of the shaft, an oxidizing centrifugal pumps and a fuel pump centrifugal that have been each other back-to-back on a common shaft. The proposed approach is based on four characteristics, optimal power system performs turbopump. These four characteristics are to achieve the desired characteristic of cavitation in pumps, in particular pump-balanced oxidizer turbine production capacity and total power consumption of the rotor pump-structures and also to estimate the mass of the turbopump feeding system as a result of this process. The design of the input parameters for the preliminary design of each component is determined and then use algorithms that are designed for the pump and turbine box design, preliminary design done. This is the optimal point, the gradient algorithm is obtained and the results with data from a real engine with a similar orbit, have been compared. Compare the
results with similar inputs real engine design, the proposed method proves correct and improve the performance characteristics of the power system shows turbopump.

References

3. V.H. Katherine, J. Bailey,A. Majumdar, Nnumerical prediction of transient Axial thrust and intrrnal flows in rocket engine turbopump, AIAA-99-2189,1999
4. V.N. Kurshev, Two problems of analyzing of turbopump of LPE, KAI, ISSN 0579-2975.Avitsionaya Tekhnika ,N2, 2001,(In Russian).
Index Terms

Computer Science  Algorithms

Keywords

Liquid Rocket engine, Turbopump, Preliminary design, feed system, Gradient algorithm