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SENSITIVITY ANALYSIS OF STATIC PARAMETERS FOR THE LOX/KEROSENE ROCKET  
ENGINE

**Abstract**

The high thrust LOX/Kerosene engine, which is called YF-100, has been developed for Chinese new generation Launch Vehicles. YF-100 is a single chamber rocket engine that utilizes an oxidizer-rich staged combustion cycle. In order to improve these new engines continually for meeting the future requirements of Chinese space missions, a new general configuration of the engine has been developed. The characteristic of this configuration which is also called post-pump swing general configuration, is swinging only the thrust chamber and some accessorial components for attitude control of launch vehicles. Due to the complex system, unavoidable deviations during the production and assembly of components, and the variation of working environment, the new engine has many working disturbance factors. Thus it is very necessary to analyze the sensitivity of the engine system parameters for the disturbance factors. The inner and outer disturbance factors considered in this paper include the variations of turbo stator flow area, pump performance parameters, thrust chamber cooling channels pressure drop, flow regulator flow rate and etc. By analyzing the nonlinear static characteristic of the engine system respectively under each disturbance factor, and establishing the system sensitive matrix, the influences of disturbance factors on the engine working parameters are obtained. The results indicate that, the engine thrust, mixing ratio, turbo-pump rotational speed, and preburner gas temperature are sensitive to some disturbance factors, such as the variations of turbo stator flow area, the LOX pump performance, flow regulator kerosene flow rate, thrust chambers cooling channels pressure drop, kerosene throttle valve pressure drop and the engine inlet LOX temperature. So these disturbance factors should be strictly controlled within a narrow range to insure the precision of the engine system static parameters. However, the other disturbance factors are allowed to change in a wider range, such as the variations of engine inlet pressure, engine inlet kerosene temperature and etc., since the engine static parameters are not so much sensitive. The rules of the sensitivity of the system static parameters for disturbance factors have been given in this paper at last.