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MODELING AND SIMULATION OF PRESSURIZATION SYSTEM IN LIQUID ROCKET

**Abstract**

Traditional calculation and analysis methods for the pressurization system in liquid rocket have lead to many dynamic unablization problems, including the shrill under working pressure and vibrations under low prssure of the controlling valve, POGO vibrations, and so on, mainly because it pays attention to the static parameters and negleats the infection between devices of the pressurization system. Therefore the dynamic characters can only be investigated by experimentation. It easily leads to the scheme reiteration and high cost. Based on advanced multi-disciplinary dynamic modeling environment simulations of engineering systems (AMESim), the method of modeling and simulations of the pressurization system is introduced in this paper. Firstly of all, the complex engineering system will be abstracted to basic modules with the following categories: mechanical, pneumatic, signal and control, thermal and hydraulic. Moreover, the models of the valve and other automatism devices will be built by connecting the basic models, and the models can also be connected to be a complex engineering system like the basic module, such as the air-feeding system, the pressurization system, and even the whole power system. The researches in this paper build the models of the pilot-safety valve, the reducer, the magnetic valve, the check valve, the tank and the gas cylinder. The model of the pilot-safety will be chosen to be verified by an experment result to show the accuracy of these models. All these models will be connected to be a system model of the cold helium pressurization system, which had been used to forecast the character exactly. This method can also work as a kind of coordination design, that is, the models built by single-machine designers to improve the single machine performances, can also be used timely by system designer to build the system models in order to improve the system performace. This can not only improve the performance, but also speed up development.