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APPLICATION OF A HEAT PIPE NETWORK IN THERMAL DESIGN OF MECHANICAL ARM JOINT OF CHINESE SPACE STATION

Abstract

As the core component of the mechanical arm of Chinese Space Station, the joint is not only the foundation to realize the mechanical motion function, but also the key to ensure the motion precision, output torque and other performance indexes. The difficulty of thermal design of mechanical arm joint is its complicated structure, multiple working modes and various external orbital heat flux. In order to solve the problem of collecting heat, transmitting heat and dissipating heat in the narrow space of the joint, the heat pipe network is used in the thermal design scheme. The thermal simulation model is established for analysis, and the temperature results of the joint are within the range of the index requirements. The layout of the joint heat pipe network for mechanical arm meets the requirement of the horizontal test performance of the heat pipe on the ground. The results of the joint thermal balance test further verify the rationality of the thermal control design, and can ensure the completion of the mechanical arm joint of Chinese Space Station in orbital task.