

Research on Level Adjusting Mechanism System of Large Space Environment Simulator

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Abstract : Space environment simulator is a device for spacecraft test. KM8 large space environment simulator built in Tianjing Space City is the largest as well as the most advanced space environment simulator in China. Large deviation of spacecraft level will lead to abnormally work of the thermal control device in spacecraft during the thermal vacuum test. In order to avoid thermal vacuum test failure, level adjusting mechanism system is developed in the KM8 large space environment simulator as one of the most important subsystems. According to the level adjusting requirements of spacecraft's thermal vacuum tests, the four fulcrums adjusting model is established. By means of collecting level instruments and displacement sensors data, stepping motors controlled by PLC drive four supporting legs simultaneous movement. In addition, a PID algorithm is used to control the temperature of supporting legs and level instruments which long time work under the vacuum cold and black environment in KM8 large space environment simulator during thermal vacuum tests. Based on the above methods, the data acquisition and processing, the analysis and calculation, real time adjustment and fault alarming of the level adjusting mechanism system are implemented. The level adjusting accuracy reaches 1mm/m, and carrying capacity is 20 tons. Debugging showed that the level adjusting mechanism system of KM8 large space environment simulator can meet the thermal vacuum test requirement of the new generation spacecraft. The performance and technical indicators of the level adjusting mechanism system which provides important support for the development of spacecraft in China have been ahead of similar equipment in the world.

Keywords : space environment simulator, thermal vacuum test, level adjusting, spacecraft, parallel mechanism

Conference Title : ICMASE 2017 : International Conference on Mechanical, Aerospace and Systems Engineering

Conference Location : Melbourne, Australia

Conference Dates : November 29-30, 2017