Paper ID: 87468
student

52nd IAF STUDENT CONFERENCE (E2)
Educational Pico and Nano Satellites (4)

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MEASUREMENT AND CONTROL SYSTEM OF LARGE AEROSTAT PLATFORM BASED ON MICRO-NANO SATELLITE ASSISTANCE

Abstract

Compared with the traditional ground communication facilities, the aerostat platform has the characteristics of high cost performance, flexible deployment, wide coverage of single point, and the near-earth space is not fully utilized at present. So it has broad development and application space in the field of communication relay and emergency communication. Accurate measurement and remote control of the aerostat are the basic guarantee for its normal operation. However, the flight height of the large aerostat is high, and the measurement and control range of the traditional ground station is limited. Under the conditions of external interference, it is difficult to ensure the safety and effective measurement and control of aerostat flying in a large range of space and stratosphere only by relying on ground stations. Aiming at the requirement of measuring and controlling large aerostat, this paper presents a method of measuring and controlling aerostat using micro-nano satellite assisted ground station. In this method, a double-layer guarantee mechanism is designed to ensure the normal operation of the aerostat: 1) The communication link between the ground station and the aerostat is normal, and the ground station directly transmits operation information to the aerostat. At the same time, the aerostat transmits information such as position to the ground station. 2) The communication link between the ground station and the aerostat is abnormal, and the aerostat flies away from the predetermined operating range. The micro-nano satellite monitors the information of the aerostat and transmits the data to the communication ground station. After data analysis, if it is normal, the aerostat will return to the measurement and control range of the ground station after running for a period of time and transmit the data information to the ground station. If the data is abnormal, the ground station sends a control command to the aerostat through the satellite to control the aerostat to return to the predetermined operating range. In case of emergency failure, the ground station uploads control instructions to the aerostat through the micro-nano satellite, and control it back to the measurement and control range of the ground station. To further verify the effectiveness of the proposed method, the simulation is carried out under typical operating conditions of aerostat. The results show that the system can effectively meet the requirements of measurement and control of aerostat.

Keywords: aerostat platform, measurement and control system, micro-nano satellite, ground station