

THE THERMAL SIMULATION ABOUT STRATOSPHERIC AIRSHIPS IN COMPLEX EXTERNAL ENVIRONMENT

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ABSTRACT The solar radiation causes the stratospheric airship to place in the heat complex environment. The temperature difference between day and night in stratospheric airship is come from complex thermal environment. The diurnal temperature difference has resulted in a large range of fluctuation of the internal-external gas pressure difference of the airship. The envelope cannot bear such a large pressure difference. The first step to solve the problem of the temperature difference between the day and night of the stratospheric airship is to simulate the temperature change of the airship. In this paper, the simulation model of the temperature change of stratospheric airship is established. A preliminary analysis of the complex radiation environment is carried out. The sensitivity of the stratospheric airship to temperature is described. The importance of establishing the complex radiation environment model is proved. The existing stratospheric radiation environment model is controversial. It is necessary to use the experimental data to verify the complex environment model. Finally, the effectiveness of the passive thermodynamic solution is simulated. Solutions include the solution of the resistance heat layer between solar cell and upper skin, low solar radiation absorbing skin and increasing airspeed. The methods can not completely solve the problem of temperature difference between day and night. Floating lift bag is the final solution for the problem of temperature difference between day and night. This will be the focus of future research.