

Analysis and Design for Parachute Deceleration and Landing Process on Mars

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Abstract

In deep space exploration, Mars exploration has always been the focus of national attention. As early as the 1960s, the United States and the Soviet union began the Mars exploration, and today, the Mars exploration is still in full swing. Since the Soviet union's first attempt to land on Mars in 1962, the world's space powers have carried out 18 landing mission, only seven successful missions. Although the success rate is less than 39 percent, future space powers will still include the Mars exploration in development planing, and China is working on a Mars exploration project.

Currently, all missions are using parachute to slow down the lander. A parachute landing on Mars is a key in the process of detection. But there is a big difference Mars parachute landing process has the characteristics of supersonic speed and low dynamic pressure. Moreover, the understanding of the atmosphere environment of Mars is not clear enough, and the understanding deviation of atmospheric parameters is large, which poses great challenges to the work of the parachute deceleration system. In addition, several key process directly affects the success or failure of the entire Mars exploration and landing mission.

Based on the above situation, this paper will focus on China's mission to Mars landing, identify the key process of the whole working process on the parachute system, and worth to pay close attention to each process of the specific issues. Through dynamic simulation method, it gives the key technical ways and research analysis of concrete problems, improving the working reliability of the Mars deceleration and landing mission.

In this paper, we first introduce the parachute deceleration system scheme and the four stages of the

deceleration and landing process of China Mars exploration. On this basis, for the parachute opening condition, the parachute ejection straight load and working performance, parachute and capsule system stability, parachute stable drop speed, capsule attitude after dropping heat bottoms, landing site scope, effect on deviation, the paper research technology approaches and analysis. This paper has certain reference significance to the Mars exploration deceleration and landing task.