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RESEARCH ON APPROACH OF RELIABILITY DESIGN AND EVALUATION FOR SPACE LAUNCH  
SYSTEMS BASED ON MISSION SECTIONS

**Abstract**

With the increasing of the number and type of space launch activities, the demands for space launch system also diverse from each other. In order to save the cost of space launch, it is necessary to carry out the mission based reliability analysis of space launch.

The reliability of space launch based on mission section is the ability of the space launch system to fulfill the specified function in the specified mission section. It considers only the failures that affect the completion of the mission, and functions that are irrelevant with the mission are not concerned. Based on the mission reliability model, the limited human, material and financial resources can be used to fulfill the functions that are closely related with the success or failure of the mission. It is helpful to reduce the cost and the risk of space launch.

In this paper, based on Failure Mode Effects and Criticality Analysis (FMECA), introducing the fuzzy mathematics, FFMECA method is formed. Firstly, the space launch mission is analyzed using the mission flow. Then, the failure modes that affect the success of the mission are distinguished in the form of quantification by the probability of failure mode effect given in the FMECA. Finally, the mission reliability is evaluated using the probability of FMECA. And the vulanerable spot of the mission can be obtained. So we can optimize the system or the flow to improve its reliability of the space launch mission. Taking a typical space launch mission for instance, by the above method, the model of reliability of the space launch mission was constructed. The quantitative and qualitative analysis of different mission sections was carried out. The result of reliability for the mission can be acquired. Application of this method can effectively guide mission and system design to improve the reliability and it is significant for the engineering application of reliability design and evaluation of space launch mission.