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SPACE DEBRIS SYMPOSIUM (A6)  
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LEO SPACE DEBRIS REMOVAL TASK ANALYSIS AND DEVELOPMENT PROPOSALS

**Abstract**

In the situation that GEO spacecraft have more and more autonomy capacity to leave away from the orbit, LEO and MEO space debris, especially the LEO space debris problem will pose serious challenges to human spaceflight activities, which should be a cause for concern and some appropriate response plan need to be developed. In view of the LEO space debris removal mission, a more comprehensive task analysis and development proposals are given by this article. Firstly, a comparative analysis of three kinds of typical deorbit mode that include autonomous reverse thrust, active removal and passive deceleration deorbit are given, and the result of the simulation and analysis show that active removal and passive deceleration deorbit are the preferred options for the current LEO debris removal. And then, combined with the LEO debris orbit height, weight, the target surface to mass ratio, fall duration, the applicable range and envelope scope of these two kinds of deorbit modes are described, and a typical strategy is formed further, which makes it clear that in what situation reverse thrust is directly used and in what situation reverse thrust to deorbit first and then passive deceleration deorbit is used. At the same time, considering the degree of target debris dangers, collision risk, debris size, debris orbit distribution, a comprehensive strategy of universal significance for LEO debris removal are given. Then based on the strategy, several feasible means of active and passive removal methods are discussed. At last, some suggestions for debris removal in next stage of development are proposed, including begin to remove the existing LEO debris, mandatory for new spacecraft with autonomous deorbit function, reduce number of new orbit objects, reduce the frequency of launching, strengthen international assistance and legislative constraints, and so on. Through the study of this article, a clear strategy basis and some operational recommendations are provided for LEO debris effective and long-term mitigation actions.