

The space debris: a thorough cleaning on earth orbits

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In this paper, our goal is to develop a general removal optimal model in terms of quality to analyze the best scenario that remove the space debris for a private firm to choose. Reliable and comprehensive as our model is, it is applicable to various space removal devices. Detailed evaluation analysis is demonstrating in the model for a commercial feasibility concern of the private firm.

Firstly, using the data and figures derived from NASA[1], we manage to develop a function fitting indicating the distribution frequency of the space debris in association with the debris' size, mass and orbital altitude. Five different methods[4,5,6,7,8,9,10] of space debris removal device are put forward, which differ from each other in efficiency of removing debris. In the body of the first model[13], differential equations are developed to describe the complex relationships among space debris's amount, launching device's amount, and supplemental rate of the removal device. In addition, risks and original cost are taken into consideration in the model by developing another function relation types[2,3]. These portions apply to general optimal choices of removal device, considering the risks and original cost in the meantime.

As for the benefits[11,12] within the removal operation, another comprehensive evaluation removing model is developed to estimate whether there is commercial opportunity for a private firm or not. This model analyzes the feasibility of every method in terms of its efficiency. And we conclude both available and unavailable situations depending on the results of the model, which takes every methods' benefit and efficiency properly into consideration.

Our entire model is robust and comprehensive, which has thought over major factors and intuitively illustrates an optimal scenario for a private company. However, as the environment of the outer space is quite complicated, further researches should pay more attention on the exterior factors that may cause effects to the removal device.

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