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CAN “GIANT” AND “TINY” CO-EXIST PEACEFULLY THE DESIGN OF RULES OF PREVENTING
COLLISION IN OUTER SPACE UNDER THE BOOM OF MICRO-SATELLITES.

Abstract

On February 3, 2018, JAXA launched a micro rocket to send a microsatellite into space. Three days later, SpaceX launched Falcon Heavy rocket and took one small step toward its Mars program. The “Giant” and “Tiny” became two hot topics for the new round of space racing. It seems important to help “Giant” and “Tiny” co-exist peacefully, and the establishment of the rules of preventing collision in outer space is an important step of this goal.

Micro-satellites, also known as small satellites, have advantages of low cost, fast updates and so on. Therefore, micro-satellites are favored by commercial companies and researchers. As a result, the number of orbiting Micro-satellites has risen sharply since 2014. However, many micro-satellites are not equipped with propulsion, which leads to their disadvantages of short on-track time and lack of manoeuvrability. At the same time, operators of micro-satellites often lack the capability to real-time monitor the orbiting of micro-satellites. Hence it is foreseeable that these “Tinies” may threaten the safe operation of “Giants”. In addition, the lack of maneuverability of micro-satellites and the incapacity of real-time monitor of operators may cause some problems to the design of the rules of preventing collision in outer space, for example, some rules of the principles of traditional rules of preventing collision become inapplicable, such as the Right of Way, and The Rules of Maintain Look-Out.

Meanwhile, civil aviation is facing similar problems: in recent years, the rapid development of mini UAVs has drawn the attention of the civil aviation industry. Researchers, government officers and even UAVs manufacturers are all participating/involved in the establishment of operation rules of UAVs, including the rules of preventing collision between UAVs and aircrafts?, their experience might be worth hearing.

This paper will firstly analyze the principles of traditional rules of preventing collision based on the study of characteristics of micro-satellites and study how to improve the rules of preventing collision to adapt to the operational characteristics of micro-satellites. Besides, this paper will analyze some ideas in the design of the rules of preventing collision for UAVs which has the similar characteristics of micro-satellites, and it will also do research on ideas which can be used in the design of the rules of preventing collision in outer space. Finally, this paper will have some suggestions for the design of the rules of preventing collision in outer space.