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SPACE DEBRIS REMOVAL IN ULTRA-CLOSE BASED ON VISUAL NAVIGATION

**Abstract**

Associated with the curiosity for space area boosting gradually, so many spacecraft have been taken into aerospace. But so much space debris has been dropped off in orbit. With incomplete statistical observation, the account of the debris which is bigger than 10cm is more than 9600. Also, there is more than 1 million debris in orbit which is smaller than 1cm. With the trend of boosting like this, the spacecraft will be difficult to avoid colliding with the debris.

Therefore space debris disposal has been the primary task for space environment cleaning and space security. Meanwhile, it also has been the responsibility and mission for all space-power nations.

This study put forward a kind of method for space debris removal in ultra-close based on visual navigation. With the spacecraft fly-around to space debris in ultra-close, spacecraft carry out image processing and information fusion with the picture which is taken from multi-angle. Then it can obtain the position of the target, and get 3D information and motion parameter with Region Matching and Contour Matching, analysis the spinning rate and the spin Axis of the space debris with the frame rate. According to the target properties, spacecraft choose the best characteristic for capture, and then proceed the mission planning with motion of the debris. In the final, spacecraft removal the space debris in the best location on the basis of the analysis result.