Short-Term Collision Probability Between a Large Debris Cloud and a Satellite Constellation

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Protecting satellites requires understanding the risks presented by orbital debris that might arise in various ways. The purpose of this research is to estimate the collision risk between a debris cloud consisting of a very large number of particles and a large satellite constellation. A method is developed to perform the collision probability estimation. The method includes an algorithm to determine the intersection region of the debris cloud and a spacecraft, and an algorithm for calculating the density of the debris cloud, in which J2 effects are partly considered. A Monte Carlo method is used to verify the method.