

SPACE DEBRIS SYMPOSIUM (A6)  
Poster Session (P)

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A CONJUNCTION RISK ASSESSMENT METHOD FOR F-VALUE BASED ON TWO-LINE  
ELEMENTS

**Abstract**

The Conjunction Assessment Team at NASA Goddard Space Flight Center has recently put forward the concept of a single risk index metric “F-value” to estimate the conjunction risk between space objects. The F-value conveys a succinct risk level by combining miss distance, collision probability, and orbit determination solution into one single value, and provides a simple and consistent metric of the comparison of conjunction risks. Now, the majority of space objects are available as Two-Line Elements (TLE) distributed by US space-track website, which are mainly used to find out potential conjunction events from large amount of space objects. Otherwise, it is not easy for us to calculate F-value by using TLE data because the method require more priori observation and orbit determination information which TLE data does not provide. In this paper we present a F-value calculation method based on TLE data which can be easily used in large amount of space conjunction assessment. Orbit prediction error of RTN direction fitted by historical TLE data, analysis time from the TCA, TLE data released time from TCA are used as quality assessment parameters. RTN separation and collision probability at TCA are used as conjunction risk parameters. We give out membership function and weighting factor of each parameter. Some examples of conjunction events are used to prove the method.