

SYMPOSIUM ON SPACE DEBRIS (A6)
Orbit Determination and Propagation (9)

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THE TRIVIAL SOLUTION PROBLEM AND A SOLVABLE METHOD OF INITIAL ORBIT
DETERMINATION USING SPACE-BASED ANGLE-ONLY MEASUREMENTS

Abstract

A method has been developed for the initial orbit elements determination via the only angle-only optical measurements, when using a space-based observatory to observe non-cooperative objects. The optical observations of space-based observatory are extremely small amount for the high relative velocity between space-based observatory and the objects. Besides, The space-based observatory follows the Keplerian law as same as the observed objects, and a trivial solution is latent in the observation functions, which causes the existing methods like Gauss and Laplace would not be solvable. The method operates by deducing a seventh-order algebraic polynomial of the unsolved range at initial time, through eliminating the trivial solution of the observation equations to iteratively calculate the initial assumed range is the heart of the procedure. A high-order Tylor's series Polynomial fitting and a new modified Laplace method is designed to iteratively calculate and refine initial orbit elements. It has been detailedly simulated with some test samples, and the performance of convergence and accuracy are summarized in the end.