ASTRODYNAMICS SYMPOSIUM (C1)
Mission Operations (3)

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AUTOMATED CONJUNCTION ANALYSIS SYSTEM AND BASIC CONCEPT OF CONTINGENCY OPERATION FOR KOMPSAT-2

Abstract

Because of the ever-increasing number of space debris, the possibility of a satellite collision with a space debris or another satellite is becoming more likely. It is necessary for satellite operation center to analyze the collision risk completely and take some appropriate actions in order to avoid catastrophic consequences in advance. Many national space agencies, such as JAXA and CNES, have their own conjunction analysis and alert system for safe operation of the satellites. The key element of prediction for collision probability is orbital information of debris and computation algorithm. This paper presents the development of automated conjunction analysis system. This system has adopted the NORAD SpaceTrack database as the main source for the orbital information of debris because of its public availability. And this system has been developed in a client-server environment which connects with Conjunction Analysis Tool in STK using Connect module in order to compute the collision probability. All objects in space including debris can be considered in conjunction analysis, and flight dynamics engineers are able to define the execution schedule and criteria for the various notification levels such as safe condition, warning, and danger. Basic concept of contingency operation procedure for KOMPSAT-2 is also proposed. This procedure for collision risks management is divided in 3 stages in accordance with the notification levels according to maximum probability(P). One is safe condition state(P<1e-8), another is warning state(P<1e-6) and the other is danger state(P>1e-6). In safe condition state, operation center only monitors the collision risks. In warning state, operation center monitors the possibility more frequently than safe condition state. In danger state, operation center monitors the possibility intensively and will convene a technical committee board that will include technical experts to decide a mitigation plan like avoidance maneuver or further actions.