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USING CONJUNCTION ANALYSIS METHODS FOR MANOEUVRE DETECTION - APPLICATION TO OPTICAL OBSERVATIONS

Abstract

Detecting manoeuvres of objects in a database is an issue to keep those objects in the database instead of having multiple instances. Those multiple instances may occur because manoeuvres lead to difficulties in the object identification and orbit determination process. Efficient manoeuvre detection helps reducing the number of duplicate objects by connecting orbits after a manoeuvre to those before.

This work is based on an earlier study where methods traditionally used for collision probability estimation were used to identify manoeuvres. It was possible to calculate a "collision probability" of two osculating element sets, representing two pseudo-objects, and therefore to decide whether a manoeuvre took place. Furthermore, by scanning the interval between both osculating epochs, e.g. calculating one collision probability for each time step, it was possible to estimate the manoeuvre epoch, too.

The progress in this study is that optical observations are tested with operator data. For the majority of objects in a database, operator data may not be present. With observations, an orbit of a presumed new detection may be tested against those in the database. As a first step, identical intervals are used to calibrate the method for operator data and observations, respectively.

The satellites are identical to those of the previous study, being Meteosat-8, -9, -10, and -11 operated by EUMETSAT. The optical observations stem from the telescope network SMARTnet^{TM}. Due to the geostationary orbits of the satellites, observations are taken from the telescopes in Sutherland (South Africa) and Zimmerwald (Switzerland), respectively.