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GPS-ASSISTED TLE GENERATION FOR ORBIT DETERMINATION OF TURION SPACE'S DROID.001 SATELLITE

Abstract

The use of GPS telemetry for the orbit determination of a satellite is a common practice in the industry. However, due to external software limitations, only TLE-based orbit determination can be directly used in the Attitude Determination and Control System (ADCS) of Turion Space's Droid.001 satellite. To address this issue, this research proposes a method to generate on-orbit Two-Line Elements (TLEs) from GPS position and velocity data, allowing for TLE-based orbit propagation through the SGP4 algorithm. The method includes creating updated TLEs at a certain period to obtain GPS-level position accuracy whilst using TLE-based orbit determination. This method's simulation and performance validation will be conducted, and its on-orbit performance will be assessed using the Droid.001 satellite. This research aims to provide a solution for accurate orbit determination for small satellites, such as Droid.001, by utilizing GPS data and TLE-based orbit propagation.