

ASTRODYNAMICS SYMPOSIUM (C1)  
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AustraliaCHARACTERISATION OF THE GEOPOTENTIAL DEFICIENCIES IN SGP4 PROPAGATION FOR  
DRAG-LESS LOW-EARTH ORBITING TEST CASES**Abstract**

SGP4 has been the customary standard for the distribution of astrodynamical and perturbative parameters for earth-orbiting objects for several decades. Nevertheless, its theoretical foundation in Brouwer theory, which features an incomplete treatment of geopotential harmonics, is one of the factors that limit its effectiveness in modern applications. Using numerical analysis, this paper compares SGP4 outputs with numerical integration of an idealised geopotential function of equivalent order for drag-less low-earth orbiting test cases to characterise the inherent deficiencies in SGP4-propagated results. The correctness of the cartesian solution generated by SGP4 will also be examined. A better understanding of these deficiencies will increase SGP4's continued utility in orbital analysis, conjunction assessment and as a starting solution in precise orbit determination methods.