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Stochastic Orbit Prediction Using KAM Tori

By Max William Yates

Biblioscholar Nov 2012, 2012. Taschenbuch. Book Condition: Neu. 246x189x13 mm. This item is printed on demand - Print on Demand Neuware - Kolmogorov-Arnold-Moser (KAM) Theory states that a lightly perturbed, conservative, dynamical system will exhibit lasting quasi-periodic motion on an invariant torus. Its application to purely deterministic orbits has revealed exquisite accuracy limited only by machine precision. The theory is extended with new mathematical techniques for determining and predicting stochastic orbits for Earth satellite systems. The linearized equations of motion are developed and a least squares estimating environment is pioneered to fit observation data from the International Space Station to a phase space trajectory that exhibits drifting toroidal motion over a dense continuum of adjacent tori. The dynamics near the reference torus can be modeled with time-varying torus parameters that preserve both deterministic and stochastic effects. These parameters were shown to predict orbits for days into the future without tracking updates--a vast improvement over classical methods of orbit propagation that require routine updates. 220 pp. Englisch.



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