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STATISTICAL PROPERTIES OF GEODESICS IN A RANDOMLY PERTURBED SCHWARZCHILD METRIC

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Abstract

The Schwarzchild metric describes general relativistic corrections to the Newtonian two body problem involving motion of a planet around the Sun or motion of a Satellite around a planet when the central force follows the inverse square law. In the presense of dust particles in the form of Comets ,meteors and asteroids in the medium in which the Satellite orbits the planet, random forces with prescribed statistics must be introduced into the equation of motion .Such forces transform the Newtonian equation of motion into Stochastic differential equations and have been adequately analyzed. However, such random gravitational force in the general theory of relativity corresponds to random perturbations of the space time geometry and must necessarily be introduced in the form of small random field perturbations to the Schwarzchild metric. In this paper , we describe such a model, compute the geodesics using first order perturbation theory and then compute the statistical correlations in the geodesic trajectory fluctuations.

Keywords: Schwarzchild metric, perturbation, statistical correlations