



About the Restricted Three-Body Problem with the Schwarzschild-de Sitter Potential

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Abstract: In this paper the restricted three body problem in the context of Schwarzschild-de Sitter's space-time is studied. The equations of motion that govern the bodies are derived using the Schwarzschild-de Sitter metric, by introducing a set known as the parameter domain, the existence of equilibrium points for any element of this set is shown. The stability conditions for the orbital motion of the system are established by the analysis of the eigenvalues of the linearized system.

Keywords: *restricted three body problem; Schwarzschild-de Sitter potential; relative equilibria; linear stability.*

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1 Introduction

A de Sitter universe is an exact solution to the Einstein field equations of general relativity, named after Willem de Sitter. Setting the foundations of a particular cosmological universe, which is characterized as spatially flat and neglects ordinary matter, thus, the dynamics of the universe is dominated by a positive cosmological constant [7], or equivalent, de Sitter solution corresponds to a metric of a space-time of constant curvature. When the curvature is negative, the cosmological constant is too, and the corresponding universe is called anti-de Sitter space. In both cases, the metric corresponds to a general symmetry of Einstein's field equations, see Brinkmann's theorem [6]. The current observations indicate that the universe is expanding in an accelerated rate, and may approach de Sitter space asymptotically, that is, the concordance models of physical cosmology are converging on a consistent model that is best described as a de Sitter universe. See

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