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Abstract

In this letter, we study the periodic solutions of the equation of barotropic Friedmann-Robertson-Walker cosmologies. Using variable transformation, the original second order ordinary differential equation is converted to a planar dynamical system. We prove that the planar dynamical system has two isochronous centers under certain parameter conditions by using Picard-Fuchs equation. Consequently, we find that there exist two families of periodic solutions with equal period for the Friedmann-Robertson-Walker model.

Keywords: periodic solution; period function; Abelian integral;
Friedmann-Robertson-Walker model

1. Introduction

In the modern cosmology, the Friedmann-Robertson-Walker (FRW) model plays an important role. Friedmann, Robertson and Walker first studied the homogenous and isotropic spacetime symmetry [1-6]. In recent years, one of the great interests at the frontier of cosmology is about barotropic fluids, which have been used as illustrative minimal models in the study of challenging problems of the dark sector of the universe, and currently they have been considered to provide available partial solution for the late acceleration of the universe due to

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