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The Mixmaster Universe in the $f(R)$ gravity.

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We consider the dynamics of the Mixmaster Universe, focusing on the Bianchi IX cosmological model (this model have a closed Universe with a spherical topology). We use $f(R)$ gravity, which is the simplest modification of the general relativity, considering the Palatini formalism, and compare the results with those of the quadratic correction. To describe the Mixmaster model, we use the Misner Chitrè –like variables, in the scalar-tensor framework. The form of the potential well depends on the self interacting scalar field potential. We start our work introducing $f(R)$ gravity theories and their most important aspects covering the largest portion of the literature. Furthermore, we demonstrate the non-chaotic nature of the Mixmaster model, if it is described by the scalar-tensor version of the $f(R)$ gravity. This work, derived in the homogeneous cosmological setting, can be easily extended to the inhomogeneous case.

Summary

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