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Starobinsky inflation and its spin-offs in the light of exact solutions

In this paper, we discuss a general method to obtain exact cosmological solutions in modified gravity, to demonstrate the method it is employed to obtain exact cosmological solutions in f(R,phi) gravity. Here, we show that, given a particular evolution of the Universe, we could obtain different models of gravity that give that evolution, using the same construction. Further, we obtain an exact inflationary solution for Starobinsky action with a negligible cosmological constant. This analysis helps us to have a better understanding of Starobinsky inflation. With our analysis, we could refine the parameter values and predictions of Starobinsky inflation. Also, we make an observation that there exists a no-go theorem for a bounce from Starobinsky action in the absence of scalar fields or a cosmological constant.

Email

josemathew@thecochincollege.edu.in

Affiliation

The Cochin College, Kochi-2

Author: MATHEW, Jose (The Cochin College)

Presenter: MATHEW, Jose (The Cochin College)

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