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Dynamics of scalar potentials in theory of gravity

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Abstract

In this paper, we explore the nature of scalar field potential in gravity using a well-motivated reconstruction scheme for flat Friedmann-Robertson-Walker (FRW) geometry. The beauty of this scheme lies in the assumption that the Hubble parameter can be expressed in terms of scalar field and vice versa. Firstly, we develop field equations in this gravity and present some general explicit forms of scalar field potential via this technique. In the first case, we take the de Sitter universe model and construct some field potentials by taking different cases for the coupling function. In the second case, we derive some field potentials using the power law model in the presence of different matter sources like barotropic fluid, cosmological constant, and Chaplygin gas for some coupling functions. From graphical analysis, it is concluded that using some specific values of the involved parameters, the reconstructed scalar field potentials are cosmologically viable in both cases. © 2019 Published by NRC Research Press.

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