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The investigation of stability of brane induced gravity model in the presence of a scalar field with various kinds of potential

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Abstract

In this manuscript we consider the normal branch of DGP brane cosmological model in the presence of a scalar field on the brane as the dark energy component. Using dynamical system approach we investigate the stability properties of the system. We will see that one of the defined new variables λ , that depends on the potential function of the scalar field has a significant role in the evolution of the universe. Therefore, we divide our discussion into two parts, the constant and the varying λ . With a good approximation we consider all the obtained critical points in the case of the constant λ , as the instantaneous critical points for the case of a varying λ . We investigate two special scalar field potential function: a double exponential potential and an inverse power law potential. In both of the cases we study the evolution of the system and discuss the fate of the universe. We find that the inverse power law potential function is in a good agreement with the current universe, but the double exponential potential function can predict different future for the universe.

Keywords: dynamical system, DGP brane cosmology, scalar field potential

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