

Cosmological perturbations in a mimetic matter model

Matsumoto J., Odintsov S., Sushkov S.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015 American Physical Society. We investigate the cosmological evolution of a mimetic matter model with arbitrary scalar potential. The cosmological reconstruction - which is the method for constructing a model for an arbitrary evolution of the scale factor - is explicitly performed for different choices of potential. The cases where the mimetic matter model shows the evolution as cold dark matter (CDM), the w CDM model, dark matter and dark energy with a dynamical $\Omega_m(z)$ [where $\Omega_m(z) \equiv [(H(z)/H_0)^2 - 1]/[(1+z)^3 - 1]$], and phantom dark energy with a phantom-nonphantom crossing are presented in detail. The cosmological perturbations for such evolutions are studied in the mimetic matter model. For instance, the evolution behavior of the matter density contrast (which is different than the usual one, i.e., $\delta + 2H\delta - \kappa^2 \rho \delta^2 = 0$) is investigated. The possibility of a peculiar evolution of δ in the model under consideration is shown. Special attention is paid to the behavior of the matter density contrast near the future singularity, where the decay of perturbations may occur much earlier than the singularity.

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