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A dynamical systems analysis of interacting dark energy models

We investigate, using dynamical system analysis, the impacts of various interaction models whereby dark energy is coupled with dark matter. Phase space analysis of each interaction is conducted where we obtain the cosmological consequence of each choice of interaction, with all components of the universe considered, namely; the radiation, matter, and dark energy dominated universes. We show that linear models breakdown at the early stages of the universe thus introduce product-like models to resolve for the breakdown. A thorough analysis on the nature of critical points was conducted, from which we found the existence of unstable radiation epoch; unstable dark matter epoch; and stable dark energy epoch. An upper limit on the coupling constant for interactions between dark matter and dark energy was found. This limit is crucial for producing cosmologically acceptable results of the matter dominated epoch, that is, the instability and deceleration of this epoch.

Apply to be considered for a student ; award (Yes / No)?

YES

Level for award;(Hons, MSc, PhD, N/A)?

MSc

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