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Cosmological singularities and analytical solutions in varying vacuum cosmologies

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Abstract

We investigate the dynamical features of a large family of running vacuum cosmologies for which Λ evolves as a polynomial in the Hubble parameter. Specifically, using the critical point analysis we study the existence and the stability of singular solutions which describe de-Sitter, radiation and matter dominated eras. We find several classes of $\Lambda(H)$ cosmologies for which new analytical solutions are given in terms of Laurent expansions. Finally, we show that the Milne universe and the $R_h = ct$ model can be seen as perturbations around a specific $\Lambda(H)$ model, but this model is unstable. © 2018, The Author(s).

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