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The past and future dynamics of quintom dark energy models

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Abstract

We study the phase space of the quintom cosmologies for a class of exponential potentials. We combine normal forms expansions and the center manifold theory in order to describe the dynamics near equilibrium sets. Furthermore, we construct the unstable and center manifold of the massless scalar field cosmology motivated by the numerical results given in Lazkoz and Leon (Phys Lett B 638:303. arXiv:astro-ph/0602590, 2006). We study the role of the curvature on the dynamics. Several monotonic functions are defined on relevant invariant sets for the quintom cosmology. Finally, conservation laws of the cosmological field equations and algebraic solutions are determined by using the symmetry analysis and the singularity analysis. © 2018, The Author(s).

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