Title: Study of some homogeneous and isotropic cosmological models in the perspective of dynamical system analysis

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Abstract:

The thesis consists of seven chapters. First chapter contains the introduction about dynamical system analysis while in next five chapters, my research works have been described. Recent observations suggest that the Universe is passing through a late stage accelerated expansion phase which standard cosmology fails to explain. Contemporary physicists seek to find an answer by fostering ingenious schemes. Their speculation ranges from the assumed existence of the 'dark energy' to the modification of the standard geometry of the spacetime.

This thesis considers both kind of approaches and investigates them in the light of dynamical systems theory. Precisely, the following attempts have been undertaken.

- In second chapter. self-interacting three-form field cosmological model has been studied using dynamical system approach. Possible bifurcation scenarios have been examined using Poincaré index theory to recognize possible cosmological phase transition.

- Third chapter contains three-form field dark energy model with baryonic matter which has been studied using dynamical system approach. Also global behavior and bifurcation analysis for this model has been studied.

- In the fourth chapter, we have studied a dynamical system analysis of cosmic evolution with coupled phantom dark energy with dark matter. In this chapter, cosmological phase transitions have been detected through bifurcation analysis which has been done by Poincaré index theory.

- In the fifth chapter, we have studied dynamical system analysis of the universe with spatial curvature. Bouncing cosmological scenarios has been shown in this chapter also.

- In the sixth chapter, we have done discrete dynamical system analysis of quintessence dark energy scalar field model with exponential potential. The critical points are analyzed with center manifold theory and stability has been discussed using Schwarzian derivative.

Finally, the last chapter contains the brief discussion and future prospects of my work.

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