POLYTROPIC GAS DARK ENERGY MODELS IN COSMOLOGY

A THESIS

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Chapter-10

Findings and Suggestions

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It was confirmed from the study that the Planck project team and the standard cosmology model assumed that the Universe's overall mass-energy included 4.9 percent ordinary matter, 26.8 percent dark matter and 68.3 percent dark energy. Therefore, study on the Universe via Dark Energy has become a significant area in Cosmology. This is the main inspiration that drives this research work. In this Thesis, we have considered the Polytropic gas as a Dark Energy to study the Universe and its behavior. There is an individual conclusion in each chapter of the Thesis, though in this chapter, we have summarized them accordingly. From our studies, we have concluded that the Universe is dominated by Polytropic gas as Dark Energy; also it may be dominated by Phantom dark energy or Quintessence dark energy. By establishing a correspondence of the Polytropic gas with the Quintessence, K-essence and Tachyon scalar fields, we have found that the Universe, may be dominated by Phantom field or Quintessence field and it expands with acceleration. The reconstruction of the Polytropic gas with the Holographic and New Agegraphic dark energy models indicates an accelerated expansion Universe. The modified $f(T)$ gravity model with the Polytropic gas represents a phantom like accelerated Universe. Through the Polytropic gas, the cosmological model of Bianchi type I was investigated and concluded that the Universe could be isotropic and flat or anisotropic and open. We also have investigated the Polytropic gas regarding the fate of the Universe in the FRW Universe and found that the Polytropic gas may avoid Big Rip singularity. Finally, we have investigated the thermodynamic behavior of the Polytropic gas and it is observed that the Polytropic gas is thermodynamically stable.

Further study of such type of investigation will be benefitted to the new researcher to understand the current accelerated expansion activities of the Universe.