Corrected entropy thermodynamics of a phenomenological dark energy model under the purview of f(T) gravity

Abstract

The present paper reports a study on variable generalized Chaplygin gas (VGCG) interacting with pressureless dark matter (DM) with interaction term Q chosen in the form $Q=3H\delta\rho_\Lambda$, where ρ_Λ denotes the density of the VGCG. Detailed cosmology of the interacting VGCG has been studied and a quintom behaviour of the equation of state (EoS) parameter has been observed. A statefinder analysis has shown attainment of ΛCDM fixed point by the interacting VGCG. Subsequently, a reconstruction scheme for $f(T)$ gravity has been presented based on the interacting VGCG with power-law form of scale factor. The EoS parameter corresponding to the reconstructed $f(T)$ has shown quintom behaviour. Finally we have studied the generalized second law (GSL) of thermodynamics in reconstructed $f(T)$ cosmology considering the universe as a closed bounded system with future event horizon as the cosmological boundary. We have associated two different entropies with the cosmological horizons with a logarithmic correction term and a power-law correction term. We have studied the validity of the GSL for both of these corrections. Our result deviates from Bamba et al., *Astrophys. Space Sci*. **344**, 259 (2013) (2013) in the sense that in the said reference, the GSL had a conditional validity for both of the corrections in the case of future even horizon. However, in the present case the GSL has failed to hold in power-law correction and has unconditional validity in logarithimic correction with future event horizon as the enveloping surface of the universe.