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Phase space analysis of LRS-BI metric in f(Q) gravity theory

Isotropy and homogeneity are the two assumptions on which the standard cosmology stands. However, some observational deviations from the standard cosmological predictions have made the researchers more interested in anisotropic cosmological models. Locally rotationally symmetric Bianchi type I (LRS-BI) metric is one of the simplest yet prominent candidates to study the anisotropic characteristics of the Universe. Further, the failure to get the observational evidence of dark energy (DE) and dark matter (DM) has made researchers look for other alternate gravity theories. The recent development of symmetric teleparallel theory equivalent to GR (STEGR) and its extension $f(Q)$ theory have provided ample opportunity for researchers to study cosmological problems in a more refined way. In this work, we have considered the $f(Q) = -(Q + 2\Lambda)$ model to study the phase space in the LRS-BI Universe to determine the system's stability along with the nature of the critical points. Here Λ represents the cosmological constant. Our study found that the LRS-BI metric in $f(Q)$ theory shows the distinct phases of the Universe like radiation-dominated, matter-dominated, and dark energy-dominated eras as predicted by standard cosmology with minor deviations.

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