

Embedding the stationary spacetimes into a Brans-Dicke cosmology via conformal transformations

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Abstract

A conformal transformation of a static or stationary metric by a time dependent conformal scale factor $S(\tau)^2$ is one of the methods of producing a cosmological spacetime. Using this knowledge and Brans-Dicke (BD) field equations, we investigate two cosmological metrics including Friedmann-Lemaitre-Robertson-Walker (FLRW) spacetime and cosmological Kerr-Newmann black hole and we obtain solutions which allow different expansion rates for each geometries. This expansion rates depend on the matter content of the untransformed parts of geometry. From where, we obtain that an accelerated expansion of the universe can only arise from a vacuum energy and the BD scalar field is the main factor causing this expansion.

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