General Relativity and Quantum Cosmology

Noether symmetric minisuperspace model of $f(R)$ cosmology

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We study the metric $f(R)$ cosmology using Noether symmetry approach by utilizing the behavior of the corresponding Lagrangian under infinitesimal generators of the desired symmetry. The existence of Noether symmetry of the cosmological $f(R)$ minisuperspace helps us to find out the form of $f(R)$ function for which such symmetry exist. It is shown that the resulting form for $f(R)$ yields a power law expansion for the cosmic scale factor. We also show that in the corresponding Noether symmetric quantum model, the solutions to the Wheeler-DeWitt equation can be expressed as a superposition of states of the form e^{iS}. It is shown that in terms of such wavefunctions the classical trajectories can be recovered.

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