

On Nonlocal Modified Theory of Gravity

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Despite many significant gravitational phenomena have been predicted and discovered using general relativity, it is not a complete theory. One of actual approaches towards more complete theory of gravity is its nonlocal modification. We consider nonlocal modification of the Einstein theory of gravity in framework of the pseudo-Riemannian geometry. The nonlocal term has the form $\mathcal{H}(R)\mathcal{F}(\square)\mathcal{G}(R)$, where \mathcal{H} and \mathcal{G} are differentiable functions of the scalar curvature R , and $\mathcal{F}(\square) = \sum_{n=0}^{\infty} f_n \square^n$ where f_n are is an analytic function of the d'Alembert operator \square . Using calculus of variations we derived the corresponding equations of motion. The variation of action is induced by variation of the metric tensor $g_{\mu\nu}$. We consider several models of the above mentioned type, as well as the case when the scalar curvature is constant. Moreover, we consider space-time perturbations of the de Sitter space. It was shown that gravitational waves are described in the class of nonlocal models $\mathcal{H}(R)\mathcal{F}(\square)\mathcal{G}(R)$, with respect to Minkowski metric by the same equations as in general relativity.

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