Abstract

Recently, an extension of the topologically massive gravity (TMG) in 2 + 1 dimensions, dubbed as minimal massive gravity (MMG), was found which is free of the bulk-boundary unitarity clash that inflicts the former theory and all the other known three dimensional theories. Field equations of MMG differ from those of TMG at quadratic terms in the curvature that do not come from the variation of an action depending on the metric alone. Here we show that MMG is a unique theory and there does not exist a deformation of TMG or MMG at the cubic and quartic order (and beyond) in the curvature that is consistent at the level of the field equations. The only extension of TMG with the desired bulk and boundary properties having a single massive degree of freedom is MMG.