

**Killing Symmetries for Chiral Self-Gravitating Models**  
**Connected with  $f(R, (\nabla R)^2, \square R)$  Gravity**  
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The modified gravity models with higher derivatives with respect to scalar curvature can be transformed to GR with a few scalar fields using Lagrange multipliers and a conformal transformation from Jordan to Einstein frame. Such resulting models can be presented as Chiral Self-Gravitating Models with fixed functional dependence for a chiral (target) space and the potential energy.

In the present contribution, we study Killing symmetries for the chiral spaces corresponding to  $f(R, (\nabla R)^2)$ ,  $f(R, \square R)$  and few versions of  $f(R, (\nabla R)^2, \square R)$  gravity. Special investigation is devoted to the modified  $f(R)$  gravity with a kinetic scalar curvature of the form:  $f(R, (\nabla R)^2) = f_1(R) + X(R)\nabla^\mu R \nabla_\mu R$ . We investigate connection of obtained Killing vectors of target space with Killing symmetry of Friedmann-Robertson-Walker and spherically symmetric spacetimes with the aim to find exact solutions of the models under consideration.