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Killing tensors as irreducible representations of the general linear group

We show that the vector space of fixed valence Killing tensors on a space of constant curvature is naturally isomorphic to a certain irreducible representation of the general linear group. The isomorphism is equivariant in the sense that the natural action of the isometry group corresponds to the restriction of the linear action to the appropriate subgroup. As an application, we deduce the Delong–Takeuchi–Thompson formula on the dimension of the vector space of Killing tensors from the classical Weyl dimension formula.