

The Noether conservation laws corresponding to some Riemannian manifolds

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We show that a large amount of information can be extracted from a knowledge of the vector fields that leave the action integral invariant, viz., Noether symmetries. In addition to a larger class of conservation laws than those given by the isometries or Killing vectors, we may conclude what the isometries are and that these form a Lie subalgebra of the Noether symmetry algebra. We perform our analysis on versions of the Vaidya metric yielding some previously unknown information regarding the corresponding manifold. Lastly, with particular reference to this metric, we show that the only variations on $m(u)$ that occur are $m = 0$, $m = \text{constant}$, $m = u$ and $m = m(u)$.