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Ricci Tensor with Six Collineations

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In classifying Ricci tensors in terms of their collineations, an interesting case possessing six collineations arises. These collineations are worked out and discussed.

The classification of spacetime metrics according to their symmetry is important (Petrov, 1969; Ziad, 1990; Bokhari and Qadir, 1987, 1990; Ziad and Qadir, n.d.). The classification of other tensors, e.g., the Riemann tensor, the Ricci tensor, or the Ricci scalar, according to their symmetry may also be important (Kramer *et al.*, 1980). The pioneering work in this direction was done by Katzin *et al.* (1969). More rigorous work was done by Davis *et al.* (1976). In this paper we readdress the same problem in a different perspective. What we intend to do (at some later stage, in the light of the present work) is to classify the general Ricci tensor in terms of its collineations following the line used by Petrov to classify metric tensors. The methods developed by us previously to classify static, spherically symmetric metrics have been employed to work out collineations of the Ricci tensor. It is seen that it gives rise to an interesting case with six collineations. Instead of deriving the full classification here, we restrict ourselves to illustrating the procedure and then deriving the six-collineation case only.

We use the spherically symmetric and static metric tensor (Petrov, 1969) to construct the component of the Ricci tensor and assume that $R_{00}=A(r)$, $R_{11}=B(r)$, $R_{22}=C(r)$, and $R_{33}=C(r)\sin^2\vartheta$.

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