Conformally flat homogeneous Lorentzian manifolds

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We consider the problem to classify conformally flat homogeneous semi-Riemannian manifolds.Conformally flat homogeneous Riemannian manifolds were classified by H. Takagi. They are all symmetric spaces. While three-dimensional conformally flat homogeneous Lorentzian manifolds were classified and the examples which are not symmetric spaces were found. In this talk, we report the result on the classification of higher dimensional conformally flat homogeneous Lorentzian manifolds.

Our classification depends on the form of the modified Ricci operators $A = \frac{1}{n-2}\left(Q - \frac{S}{2(n-1)}Id\right)$, where Q is the Ricci operator and S is the scalar curvature. We classified the case when A is diagonalizable with real eigenvalues in the previous paper . If A is not diagonalizable with real eigenvalues, then three cases for its form may occur. For two cases, we show complete local classifications. They are not locally symmetric except one example. For the last case, we can show examples but cannot solve the classification problem at the present.