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Curvature homogeneous geometries

A pseudo-Riemannian manifold M is curvature homogeneous of order s if the components of the curvature tensor and its first s covariant derivatives are constant relative to some local frame. If M is locally homogeneous, then it is curvature homogeneous. Remarkably, the converse is also true, in some fashion: if M is curvature homogeneous of order s and if s is greater than a certain bound, called the Singer index, then M is locally homogeneous. We establish that the Singer index for 4-dimensional CH, Lorentzian manifolds is equal to 2. Our approach is to formulate the field equations for a CH geometry as an involutive EDS on the second-order frame bundle of M .