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5. Differential Geometry and Global Analysis

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Algebras related to Lie triple systems and applications to Differential Geometry

A classic problem in Differential Geometry, the determination of the invariant affine connections in the simply connected compact irreducible Riemannian symmetric spaces, is equivalent to the algebraic problem of determining the set $Hom_{DerT}(T \otimes_F T, T)$ for any simple finite-dimensional Lie triple system T. It is shown that this set contains nontrivial elements if and only if T is related to a simple Jordan algebra. This provides a new proof of the determination of the invariant affine connections in the mentioned spaces and we apply it to compute the holonomy and the different tensors associated to the connection.