Nonsymmetric gravitational theory: Results and applications

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Abstract

Linear connections with torsion play an important role in nonsymmetric gravitational theory and in the study of generalized Riemannian manifolds $(M, G = g + F)$, where g is the symmetric non-degenerate part of G and F is the skew-symmetric part.

We first consider the case when F is defined by an almost complex, almost contact, para-Hermitian or para-contact structure. In particular, an almost Hermitian manifold satisfies Einstein's metricity condition for a connection with totally skew-symmetric torsion if and only if it is nearly Kähler. We also consider the almost contact case, with special attention to dimension five and Sasaki–Einstein manifolds.

Then we consider more general structures where F has constant rank and is defined by weak metric structures, including weak almost Hermitian and weak f-structures. For F of maximal rank, we obtain decomposition results connected with the eigen-distributions of the corresponding skew-symmetric tensor and weighted products of nearly Kähler manifolds. For $\operatorname{rank}(F) < \dim M$, we consider weak f-structures and prove decomposition results for generalized Riemannian manifolds. We describe Einstein connections for these structures.

References

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