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Covariant Averaging in a Class of Metric-Affine Theories of Gravity

The averaging problem is a longstanding unresolved problem of general relativity. One of the concerns in the averaging problem is the question of how to define an average over tensor quantities in a physically sensible manner when the tensors are defined at separate spacetime points. In our novel approach to the problem we make use of an equivalence between general relativity and a class of teleparallel theories of gravity. When a teleparallel structure exists on a manifold a covariant averaging process can be formulated easily with the framework of metric-affine theories of gravity. This averaging procedure will be illustrated with a specific example and cosmological implications will be discussed.