

NONCOMMUTATIVE LEVI-CIVITA CONNECTIONS IN DERIVATION BASED CALCULI

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We study the existence of Levi-Civita connections, i.e torsion free connections compatible with a hermitian form, in the setting of derivation based noncommutative differential calculi over $*$ -algebras. We prove a necessary and sufficient condition for the existence of Levi-Civita connections in terms of the image of an operator derived from the hermitian form. Moreover, we identify a generalized symmetry condition on the hermitian form that extends the classical notion of metric symmetry in Riemannian geometry.