Ionescu, Lucian M.

Nonassociative algebras: a framework for differential geometry. (English) Zbl 1040.58001

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The author considers a (possibly) nonassociative algebra endowed with an additional Lie algebra structure $(A, \mu, [\cdot, \cdot])$, called a torsion algebra, and a covariant calculus is defined. A torsion algebra is based on the interpretation of its elements as vector fields with its multiplication interpreted as a connection. This provides a framework for differential geometry on a formal manifold with a formal connection. The torsion algebras generalizes pre-Lie algebras which appear as the "torsionless" case. The starting point is the observation that the associator of a nonassociative algebra is essentially the curvature of the corresponding Hochschild quasicomplex. It is a cocycle, and the corresponding equation is interpreted as Bianchi identity. The curvature-associator-monoidal structure relationships are discussed and conditions on torsion algebras allowing to construct an algebra of functions, whose algebra of derivations is the initial Lie algebra, are considered (Section 4). The main example of a torsion algebra is provided by the pre-Lie algebra of Hochschild cochains of a k-module, with Lie bracket induced by Gerstenhaber composition .

Reviewer: Neculai Papaghiuc (Iaşi)

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17A75 Composition algebras
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