

On the higher order geometry of weil bundles over smooth manifolds and over parameter-dependent manifolds

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Abstract

The Weil bundle T^*A of an n -dimensional smooth manifold M^n determined by a local algebra A in the sense of Weil carries a natural structure of an n -dimensional A -smooth manifold. This allows ones to associate with T^*A the series $Br(T^*A)$, $r = 1, \dots, \infty$, of A -smooth r -frame bundles. As a set, $Br(T^*A)$ consists of r -jets of A -smooth germs of diffeomorphisms $(A, 0) \rightarrow T^*A$. We study the structure of A -smooth r -frame bundles. In particular, we introduce the structure form of $Br(T^*A)$ and study its properties. Next we consider some categories of m -parameter-dependent manifolds whose objects are trivial bundles $M^n \times \mathbb{R}^m \rightarrow \mathbb{R}^m$, define (generalized) Weil bundles and higher order frame bundles of m -parameter-dependent manifolds and study the structure of these bundles. We also show that product preserving bundle functors on the introduced categories of m -parameter-dependent manifolds are equivalent to generalized Weil functors.

Keywords

Higher order connection, Product preserving bundle functor, Weil bundle