Another curvature in synthetic differential geometry

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Abstract

Although the second Bianchi identity has been discussed in somewhat nonstandard literature of synthetic differential geometry (cf. Lavendhomme [1991] and Kock [1996]), it still remains to be couched and established within the standard realm of synthetic discourses. The principal objective of this paper is to show that a slightly modified version of curvature form enjoys the identity. Our discussion will be carried out within the appropriate framework of vector bundles.

0   Introduction

Although Kock [1996] and Lavendhomme [1991] have established the second Bianchi identity in their own synthetic discourses, they have approached the identity somewhat nonstandardly. The identity still remains to be established on the main street of synthetic differential geometry. By our locution "the main street of synthetic differential geometry" we have in mind Lavendhomme's [1996] celebrated textbook on synthetic differential geometry up to Chapter 5 (but not later chapters) as its quintessence. This locution is not intended at all to lessen their somewhat nonstandard approaches to synthetic differential geometry, let alone to insist that their approaches are of little geometric interest. We would like to contend exactly that any story of curvature form could not be finished without the second Bianchi identity even touched.