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## differential geometry using Robinson's infinitesimals?

Is there a detailed treatment of differential geometry using Robinson's infinitesimals?

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reference-request

dg.differential-geometry

nonstandard-analysis

edited Feb 3 '16 at 16:00

asked Apr 2 '13 at 11:59



Shamisen

1,244 3 16 25



Mikhail Katz

8,111 32 90

4

3 Since you specified Robinson, you might not be interested in the other type of infinitesimals (nilpotent). But Models for Smooth Infinitesimal Analysis by Moerdijk and Reyes treats a number of topics in differential geometry (using both invertible and nilpotent infinitesimals, but mainly the latter). –

[Todd Trimble](#) ♦ Apr 2 '13 at 12:33

2 Differential geometry using the infinitesimals Todd mentions is known as synthetic differential geometry: [ncatlab.org/nlab/show/synthetic+differential+geometry](http://ncatlab.org/nlab/show/synthetic+differential+geometry). There are a couple of online textbooks by Anders Kock listed there. –

[David Corfield](#) Apr 2 '13 at 14:47

## 2 Answers

I'm not aware of much. But two works worth noting are:

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K.G. Schlesinger. Generalized Manifolds. Chapman & Hall/CRC, 1997.

I.O. Hamad. Generalized curvature and torsion in nonstandard analysis. PhD thesis, Salahaddin University - Erbil, 2007.

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Somewhat belatedly we developed foundations for differential geometry using infinitesimal displacements [here](#):

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Nowik, T.; Katz, M. "Differential geometry via infinitesimal displacements." *Journal of Logic and Analysis* 7:5 (2015), 1-44.

answered Feb 3 '16 at 13:08



[Mikhail Katz](#)

8,111 32 90