

RG.zip

is a collection of Mathematica notebooks and packages developed as an interactive textbook

Pseudo-Riemannian Geometry and Tensor Analysis

The first condition for using it interactively is the access to Stephen Wolframs program Mathematica. The free program Wolfram CDF-Player permits a passive look into the notebooks only. The notebooks and packages contained in RG.zip are tested with Mathematica v. 9.0.1, 10.4, 11.1.1, but very likely they work with earlier versions too.

Prerequisite for using the course is knowledge of analysis and linear algebra as usually learned in the first two years of a study of mathematics. For learning the Riemannian geometry a knowledge of tensor algebra is necessary. I added the notebook vectensalgv2.nb,

Vector and Tensor Algebra

based on the package tensalgv3.m containing an implementation of this matter into Mathematica.

The interactive textbook is the notebook RGv2.nb, titled "Pseudo-Riemannian Geometry and Tensor-Analysis". The added packages: euvecv2.m, neuvecv2.m, tensalgv3.m, riemannv2.m. are obligatory for working with the notebook. Copy them together with the notebook RGv2.nb into your working directory and proceed as written in the section "Initialization" of the notebook. The other files:

index.nb, testD.nb (subnotebooks to RGv2.nb)
CURVES.m, SURFS.m (Alfred Gray's collections of curves and surfaces)
vectensalgv3.nb (Tensor algebra in Mathematica)

contain tools useful at working with Mathematica in differential geometry or other applications of tensor calculus. I recommend to copy them into the working directory too.

The notebook RGV2.nb is the second version of the notebook RG.nb contained in DGC.zip which now is separated in two parts: Rg.zip and EDG.zip (Euclidean Differential Geometry); these parts should be used independently of each other. Particularly the Mathematica packages of both parts or earlier versions of these packages should not be loaded together in a Mathematica session. Not regarding this can lead to symbol mismatch and errors.

I will be glad on all feedback, reports on errors, problems, success or failures at work with the here presented Mathematica programs. Write to sulanke@mathematik.hu-berlin.de

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