

Mathematica SW for tensor calculus in GR





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Gravitational Waves

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Mathematica Packages

Several Mathematica Packages exist, most of them can be found in the [Wolfram Library Archive](#). Here, I briefly discuss one specific package, [GRQUICK](#)

ALL COLLECTIONS	ARTICLES	BOOKS	CONFERENCE PROCEEDINGS
COURSEWARE	DEMOS	MATHSOURCE	TECHNICAL NOTES
Title	 DOWNLOADS		
GRQUICK			
Author			
Jaime Varela Organization: University of California Berkeley Department: Physics			
Revision date			
2013-01-30			
Description			
GRQUICK is a Mathematica package designed to quickly and easily calculate/manipulate relevant tensors in general relativity. Given an NxN metric and an N-dimensional coordinate vector, GRQUICK can calculate the: Christoffel symbols, Riemann Tensor, Ricci Tensor, Ricci Scalar, and Einstein Tensor. Along with calculating the above tensors, GRQUICK can be used to: manipulate four vectors in curved space, define tensors, display the geodesic equations, take covariant derivatives of tensors, and plot geodesics. See the example notebook for specific notation on tensors.			
Subject			
► Science > Physics > Relativity Theory			
Keywords			
Einstein, tensor, physics, general relativity, schwarzschild, metric, field equations, vector, black hole, black-hole, covariant derivative, geodesics, geodesic plotting			
Downloads	 DOWNLOAD Wolfram CDF Player»		
 GRQUICK.m (21.2 KB) - Mathematica Package			
 GRQUICK_manual.nb (216 KB) - Mathematica Notebook			

How to use

The package has been developed several years (and versions of Mathematica) ago, and needed updating. The relevant updated files can be downloaded from this link

https://wwwusers.ts.infn.it/~milotti/Didattica/GravitationalWaves/Mathematica_SW/

The directory contains a manual, which includes the installation instructions, summarized below

Basics

This notebook gives examples of the functions in GRQUICK. First we load the package.

To install the package go to:

- 1.) go to File->Install
- 2.) in the dialogue box that pops up select:
- 3.) Type of Item to Install: Package
- 3.) Source->From File
- 4.) find and select the file GRQUICK-1.wl






To load the package use the “<<” command below.

```
In[*]:= << GRQUICK-1.wl
```

Examples

The directory also contains two files used to carry out calculations with a generic diagonal metric and with gravitational waves (+ polarization only). In the latter case, note that first order or second order expansions need to be done a posteriori.

Index of /~milotti/Didattica/GravitationalWaves/Mathematica_SW

<u>Name</u>	<u>Last modified</u>	<u>Size</u>	<u>Description</u>
 Parent Directory		-	
 DiagonalMetric-GW.nb	2025-11-16 18:13	111K	
 DiagonalMetric.nb	2025-11-14 12:34	272K	
 GRQUICK-1.wl	2025-11-12 12:42	21K	
 GRQUICK_manual-1.nb	2025-12-03 12:05	406K	