

# Introduction to `Sim.DiffProc` R Package

by Arsalane Chouaib Guidoum<sup>1</sup> and Kamal Boukhetala<sup>2</sup>

October 29, 2015

## 1 Introduction

The package `Sim.DiffProc` [Guidoum and Boukhetala, 2015] is an object created in the `R Development Core Team` [2015] provide functions useful to simulating of (multidimensional) stochastic differential equations (SDE's), and statistically analyze the diffusion process solution of SDE's; the project was officially launched in September 2010 and is under active development by the authors. The current feature set of the package can be split in more main categories: Computing the stochastic integrals of Itô or Stratonovich type. Simulation SDE's and diffusion bridge of Itô or Stratonovich type, with different methods. Random number generators (RN's) to generate SDE's. First-passage-time (f.p.t) in SDE's. Estimate drift and diffusion parameters using pseudo-maximum likelihood estimators of 1-dim SDE's. Displaying an object inheriting from a class of SDE's.

Moreover, the package follows the general R philosophy of working with model objects, can then be manipulated at one's will using various extraction, summary or plotting and several functions. Whenever possible, we develop a graphical user interface `Sim.DiffProcGUI` of the various functions of a coherent whole, to facilitate the use of this package. These tools are very useful and can be used in teaching and research, and contribution to reducing the gap between theory and application of the diffusion process in several areas.

## 2 Documentation

It is a requirement of the R packaging system that every function and data set in a package has a help page. The `Sim.DiffProc` package follows this require-

---

<sup>1</sup>Faculty of Mathematics.

Department of Probabilities & Statistics.

University of Science and Technology Houari Boumediene. BP 32 El-Alia, [U.S.T.H.B](#), Algeria.  
[acguidoum@usthb.dz](mailto:acguidoum@usthb.dz)

<sup>2</sup>Faculty of Mathematics.

University of Science and Technology Houari Boumediene. BP 32 El-Alia, [U.S.T.H.B](#), Algeria.  
[kboukhetala@usthb.dz](mailto:kboukhetala@usthb.dz)

ment strictly. In addition to the help pages, the package includes vignettes and demonstration scripts;

```
> help(Sim.DiffProc)
> vignette(package = "Sim.DiffProc")
```

and

```
> demo(package = "Sim.DiffProc")
```

### 3 Requirements

R version  $\geq$  2.15.1.

### 4 Licence

This package and its documentation are usable under the terms of the "GNU General Public License", a copy of which is distributed with the package.

### 5 Collaboration and citation

Obviously, the package leaves many other fields of stochastic modeling with Itô and Stratonovich SDE's untouched. For this situation to change, we hope that experts in their field will join their efforts to ours and contribute code to the `Sim.DiffProc` project. The project will continue to grow and improve by the authors to the community of developers and users. If you use `Sim.DiffProc` please cite the software in publications; use `citation()` for information on how to cite the software;

```
> citation("Sim.DiffProc")
```

### Note

Please send comments, error reports, etc. to the author via the addresses email.

### References

Guidoum, A. C. and Boukhetala, K. (2015). `Sim.DiffProc`: Simulation of Diffusion Processes. R package version 3.0. <http://CRAN.R-project.org/package=Sim.DiffProc>

R Development Core Team (2015). *R: A Language and Environment for Statistical Computing*. Vienna, Austria. <http://www.R-project.org/>