RiDMC: an R package for the numerical analysis of dynamical systems

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Abstract

RiDMC is an R package for the numerical analysis of discrete- and continuous-time dynamical systems. With RiDMC the user can easily encode a model in the simple, interpreted LUA language, and immediately perform numerical analysis with a variety of algorithms. The LUA language gives maximum flexibility in model specification, and allows for the introduction of stochastic components in a very natural way. Or if the user wants to work with an existing model, he may choose from a large number of well-known dynamical systems already available in the package.

Once a model is loaded, the user can compute trajectories, bifurcation diagrams, Lyapunov spectra, basins of attraction and periodic cycles. For each analytical routine there is an associated plotting function, with reasonable default settings (axes labelling, font sizes, etc.), so that publication-quality plots can be produced directly with almost no additional effort. Moreover, plots are based on the grid system, so that full plot customization, manipulation and reuse is possible for more expert R users.

RiDMC uses the idmclib C library for interpreting user-supplied models and for doing core numerical computing. The idmclib library, released with sources under the GPL-v2 license, is small, well-documented and easy to understand for anyone desiring a closer look at the internal numerical algorithms.

A set of interesting case studies is presented as a demonstration of the package capabilities.

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