

Validated numerics (K. Jackson)

Kenneth R Jackson
krj@cs.toronto.edu
University of Toronto, Canada

Compared to standard numerical methods for initial value problems (IVPs) for ordinary differential equations (ODEs), validated numerical methods have two important advantages: if they return a solution to a problem, then

1. the problem is guaranteed to have a unique solution, and
2. an enclosure of the true solution is produced.

The first speaker in this minisymposium will provide some background material on interval arithmetic and automatic differentiation needed to understand validated numerical methods for ODEs. The next two speakers will discuss some recent progress in developing validated numerical methods for ODEs. The final speaker will summarize his recent work on using validated numerical methods to produce a computational proof that, given a numerical solution of an IVP for an ODE, there exists a true solution of the same ODE (but normally with different initial conditions) that stays close to the numerical solution throughout the interval of integration. (That is, the numerical solution has a *shadow*.)