

Strong Stability Preserving (TVD) High Order Time Discretization Methods

Steven Ruuth

`sruuth@sfu.ca`

Simon Fraser University

It is common practice in solving time dependent partial differential equations (PDEs) to first discretize the spatial variables to obtain a semi-discrete method of lines scheme. The subsequent ordinary differential equation system can be discretized by an ODE solver. For problems with smooth solutions, a linear stability analysis is often adequate. For problems with discontinuous solutions, however, such as solutions to hyperbolic problems, a stronger measure of stability is usually required. In this talk, we review and develop strong stability preserving high order time discretizations for semi-discrete method of lines approximations of PDEs. We describe a new class of schemes that allows larger stable step sizes and gives improved efficiency over methods currently available.