Modified Patankar-Runge-Kutta schemes for Advection-Diffusion-Production-Destruction Systems

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Modified Patankar-Runge-Kutta (MPRK) schemes are numerical methods for the solution of positive and conservative production-destruction systems. They adapt explicit Runge-Kutta schemes in a way to ensure positivity and conservation of the numerical approximation irrespective of the chosen time step size.
In this talk we present an investigation of MPRK schemes in the context of convection-diffusion-reaction equations with source terms of production-destruction type. The time-splitting approach is used to integrate the reaction terms with MPRK schemes. In particular, the efficiency of MPRK schemes in case of stiff reactions will be discussed.