

Numerical Analysis and PDE

Splitting based integrators for nonlinear parabolic equations

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In this talk we consider splitting integrators applied to nonlinear parabolic problems. Such equations are frequently encountered as they, e.g., describe reaction-diffusion systems, and splitting schemes often give rise to very efficient time integrators in this context. By formulating the parabolic problems as evolution equations governed by m -dissipative vector fields, we obtain a general framework which serves as the foundation of our numerical analysis. First, we employ approximation results from the nonlinear semigroup theory and derive convergence of several splitting schemes. Secondly, we present a new strategy to obtain convergence orders for (formally) first-order schemes when, e.g., applied to degenerate parabolic equations with delay source terms and the abstract Riccati equation.

This is joint work with Tony Stillfjord and Erik Henningsson.