Lubich, Ch.; **Ostermann, A.**

Linearly implicit time discretization of nonlinear parabolic equations. (English)

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The authors consider linearly implicit one-step methods for time- discretization of linear and nonlinear parabolic differential equations. Stability results and several error estimates with different approximation orders are proven for the Rosenbrock methods and the W- methods where the last ones do not require the exact Jacobian of the problem. Remarks on the convergence order of the extrapolated linearly implicit Euler method are given.

The parabolic equations are studied in a Hilbert space framework. Several examples are considered, e.g., semilinear and quasilinear parabolic equations and stiff reaction-diffusion equations. The paper contains no numerical results.

Reviewer: W.Petry (Düsseldorf)

MSC:

65M20	Method of lines for initial value and initial-boundary value problems involving PDEs	Cited in **45** Documents
65M12	Stability and convergence of numerical methods for initial value and initial-boundary value problems involving PDEs	
65M15	Error bounds for initial value and initial-boundary value problems involving PDEs	
35K55	Nonlinear parabolic equations	
35K57	Reaction-diffusion equations	

Keywords:

stability; linearly implicit one-step methods; time-discretization; nonlinear parabolic differential equations; error estimates; Rosenbrock methods; W-methods; convergence; implicit Euler method; stiff reaction-diffusion equations

Full Text: DOI