# Linearly implicit splitting methods for higher space-dimensional parabolic differential equations

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Abstract: Splitting methods are recognized as useful tools in the numerical solution of initial boundary value problems of multi(space)-dimensional partial differential equations. Following the method of lines we introduce a new class of linearly implicit splitting methods for the numerical solution of the systems of ordinary differential equations arising from the semidiscretization in space of a parabolic differential equation. In the usual splitting formulas the nonlinear equation systems are solved by Jacobian-based iteration methods. In general, the Jacobian matrices used have a simple structure (often tridiagonal). The linearly implicit splitting formulas directly involve approximations to the Jacobian matrices in the scheme so that only linear equation systems with simple coefficient matrices have to be solved. Furthermore, these formulas are consistent of order two and have good stability properties. 

Author Keywords: Initial boundary value problems; Linearly implicit methods; Method of lines; Numerical analysis; Splitting methods

Index Keywords: Approximation theory; Initial value problems; Matrix algebra; Partial differential equations; Problem solving; Linearly implicit splitting methods; Multi-dimensional parabolic differential equations; Iterative methods

Year: 1998

Source title: Applied Numerical Mathematics

Volume: 28

Issue: 4-Feb

Page : 259-274



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ISSN: 1689274

CODEN: ANMAE

Language of Original Document: English

Abbreviated Source Title: Applied Numerical Mathematics

Document Type: Article

Source: Scopus

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