

Lewis, David L.; Lund, John; Bowers, Kenneth L.

The space-time Sinc-Galerkin method for parabolic problems. (English) Zbl 0643.65068
Int. J. Numer. Methods Eng. 24, 1629-1644 (1987).

The authors develop an infinite-order space-time Galerkin method for a parabolic partial differential equation in one space dimension. The basis functions of the method are sinc-functions composed with conformal maps. The Galerkin technique is employed simultaneously in space and time. It is shown that the method possesses exponential rate of convergence, ease of assembly of the discrete system, a global approximation and the ability to handle singular problems. The presented method does not have any restriction with regard to a largest time computation as this method provides global approximation to the solutions.

Reviewer: [S.C.Rajvanshi](#)

MSC:

- [65N30](#) Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs Cited in 12 Documents
- [65N15](#) Error bounds for boundary value problems involving PDEs
- [35K20](#) Initial-boundary value problems for second-order parabolic equations

Keywords:

[sinc-Galerkin method](#); [infinite-order space-time Galerkin method](#); [exponential rate of convergence](#); [global approximation](#); [singular problems](#)

Full Text: [DOI](#)

References:

- [1] and , *Fundamental Concepts in the Numerical Solution of Differential Equations*, Wiley, New York, 1983.
- [2] Evans, *Int. j. numer. methods eng.* 23 pp 1145– (1986)
- [3] Fairweather, *IMA J. Numer. Anal.* 3 pp 173– (1983)
- [4] Hlava'cek, *Appl. Mat.* 17 pp 327– (1972)
- [5] Joubert, *Numer. Math.* 17 pp 409– (1971)
- [6] 'A fully Galerkin method applied to parabolic problems', Ph.D. Thesis, Montana State University, Bozeman Montana, 1987.
- [7] Lund, *Math. Comp.* 47 pp 571– (1986)
- [8] Seward, *IMA J. Numer. Anal.* 4 pp 375– (1984)
- [9] Stenger, *Math. Comp.* 33 pp 85– (1979)
- [10] Yu, *Int. j. numer. methods eng.* 23 pp 737– (1986)
- [11] *Circulant Matrices*, Wiley, New York, 1979. · [Zbl 0418.15017](#)
- [12] and , 'Symmetrization of the Sinc-Galerkin method with block techniques for elliptic equations', submitted to *IMA J. Numer. Anal.* (1986).

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.