PACKAGE ID - 000167CY00100 ICCG2

KWIC TITLE - 2d PDE Linear Symmetric Matrix Solver

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LIMITATION CODE -UNL **AUDIENCE CODE -** UNL

COMPLETION DATE - 10/01/1983 **PUBLICATION DATE -** 02/01/1983

DESCRIPTION - ICCG2 (Incomplete Cholesky factorized Conjugate Gradient algorithm for 2d symmetric problems) was developed to solve a linear symmetric matrix system arising from a 9-point discretization of two-dimensional elliptic and parabolic partial differential equations found in plasma physics applications, such as resistive MHD, spatial diffusive transport, and phase space transport (Fokker-Planck equation) problems. These problems share the common feature of being stiff and requiring implicit solution techniques. When these parabolic or elliptic PDE's are discretized with finite-difference or finite-element methods,the resulting matrix system is frequently of block-tridiagonal form. To use ICCG2, the discretization of the two-dimensional partial differential equation and its boundary conditions must result in a block-tridiagonal supermatrix composed of elementary tridiagonal matrices. The incomplete Cholesky conjugate gradient algorithm is used to solve the linear symmetric matrix equation. Loops are arranged to vectorize on the Cray1 with the CFT compiler, wherever possible. Recursive loops, which cannot be vectorized, are written for optimum scalar speed. For matrices lacking symmetry, ILUCG2 should be used. Similar methods in three dimensions are available in ICCG3 and ILUCG3. A general source containing extensions and macros, which must be processed by a pre-compiler to obtain the standard FORTRAN source, is provided along with the standard FORTRAN source because it is believed to be more readable. The pre-compiler is not included, but pre-compilation may be performed by a text editor as described in the UCRL-88746 Preprint.

PACKAGE CONTENTS - NESC Note; Software Abstract; UCRL-88744 PREPRINT;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD Rom

COMPUTER - CRAY1

OPERATING SYSTEMS - CTSS

PROGRAMMING LANGUAGES - FORTRAN

SOURCE CODE AVAILABLE (Y/N) - Y

HARDWARE REQS - At least 14*mn, where mn is the number of linear equations.

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HARDWARE REQS -(CONT)

REFERENCES - D.V. Anderson and A.I. Shestakov, ICCG2: Subprograms for the Solution of a Linear Symmetric Matrix Equation Arising from a 9-Point Discretization, Computer Physics Communications, Vol. 30, No. 1, pp. 37-42, 1983, also available as UCRL-88744 Preprint, February 1983; D.V. Anderson, ICCG3: Subprograms for the Solution of a Linear Symmetric Matrix Equation Arising from a 7, 15, 19 or 27 Point 3D Discretization, Computer Physics Communications, Vol. 30, No. 1, pp. 51-57, 1983, also available as UCRL-88746 Preprint, February 1983.

ABSTRACT STATUS - Abstract first distributed July 1983. Cray1 version submitted May 1983, replaced October 1983.

SUBJECT CLASS CODE - XP

KEYWORDS -

I CODES
PARTIAL DIFFERENTIAL EQUATIONS
NUMERICAL SOLUTION
ELLIPTICAL CONFIGURATION
MATRICES
FORTRAN
ALGORITHMS
PLASMA
CHARGED-PARTICLE TRANSPORT
COMPUTER PROGRAM DOCUMENTATION
FOKKER-PLANCK EQUATION

EDB SUBJECT CATEGORIES -
990200 700330

SPONSOR - DOE/ER

PACKAGE TYPE - SCREENED