

PACKAGE ID - 000264IBMPC00 LSODKR

KWIC TITLE - ODE System Solver W. Krylov Iteration &
Rootfinding

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

COMPLETION DATE - 09/09/1991 **PUBLICATION DATE** - 09/09/1991

DESCRIPTION - LSODKR is a new initial value ODE solver for stiff and nonstiff systems. It is a variant of the LSODPK and LSODE solvers, intended mainly for large stiff systems. The main differences between LSODKR and LSODE are the following: (a) for stiff systems, LSODKR uses a corrector iteration composed of Newton iteration and one of four preconditioned Krylov subspace iteration methods. The user must supply routines for the preconditioning operations, (b) Within the corrector iteration, LSODKR does automatic switching between functional (fixpoint) iteration and modified Newton iteration, (c) LSODKR includes the ability to find roots of given functions of the solution during the integration.

PACKAGE CONTENTS - Media Directory; Software Abstract; Media Includes Source Code, Executable;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 5.25 Diskette

METHOD OF SOLUTION - Integration is by Adams or BDF (Backward Differentiation Formula) methods, at user option. Corrector iteration is by Newton or fixpoint iteration, determined dynamically. Linear system solution is by a preconditioned Krylov iteration, selected by user from Incomplete Orthogonalization Method, Generalized Minimum Residual Method, and two variants of Preconditioned Conjugate Gradient Method. Preconditioning is to be supplied by the user.

COMPUTER - IBM PC

OPERATING SYSTEMS - DOS - no system-dependence

PROGRAMMING LANGUAGES - FORTRAN IV

SOFTWARE LIMITATIONS - NONE

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SOURCE CODE AVAILABLE (Y/N) - Y

UNIQUE FEATURES - Krylov iterative methods with user-supplied preconditioning. Automatic switching between Newton and functional iteration. Rootfinding feature coupled with system integration.

RELATED SOFTWARE - LSODKR is similar to LSODPK in the use of Krylov methods with both Adams and BDF integration; it is similar to LSODAR in its rootfinding ability. Uses some LINPACK routines; the package supplied includes a condensed version of SLATEC error message handling routines.

OTHER PROG/OPER SYS INFO - NONE

HARDWARE REQS - NONE

TIME REQUIREMENTS - Highly dependent on machine and problem.

REFERENCES - Peter N. Brown and Alan C. Hindmarsh, Reduced Storage Matrix Methods in Stiff ODE Systems, J. Appl. Math & Comp., 31 (1998), pp. 40-91; L.L.N.L. Report UCRL-95088, Rev. 1, June 1987; Alan C. Hindmarsh, ODEPACK, A Systematized Collection of ODE Solvers, in Scientific Computing, R.S. Stepleman et al. (Eds.), North-Holland, Amsterdam, 1983, pp. 55-64.

ABSTRACT STATUS - Submitted Feb. 1 1992.

SUBJECT CLASS CODE - P

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
L CODES
DIFFERENTIAL EQUATIONS
NUMERICAL SOLUTION
NONLINEAR PROBLEMS
ITERATIVE METHODS

EDB SUBJECT CATEGORIES -
990200

SPONSOR - DOE/ER

PACKAGE TYPE - SCREENED