PACKAGE ID - 000568IBMPC00 LXF1D/LXF2D

KWIC TITLE - 1 and 2-Dimensional Line Transfer Package

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

COMPLETION DATE - 07/01/1990 **PUBLICATION DATE -** 07/01/1990

DESCRIPTION - LXF1D is a one dimensional steady-state line transfer package designed to handle: overlapping and or interacting lines, planar, cylindrical, spherical (and special) geometries, doppler shifts, complete redistribution (CRD), partial redistribution (PRD). PRD requires the use of REDIST or some other package to produce emission profiles. LXF2D is a two dimensional version of LXF1D for xy and rz geometries. Both LXF1D and LXF2D are designed to be added to existing non-local thermodynamic equilibrium (NLTE) codes with a minimum of effort.

PACKAGE CONTENTS - Software Abstract; Media Directory; Media Includes Documentation, Source Code, Compilation Instructions, Sample Problem Input and Output;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 Diskette

METHOD OF SOLUTION - The transfer algorithms used are, where possible, second-order accurate and reasonably robust. Formal transfer is done using either the Feautrier formalism (LXF1D) or an integral formalism (LXF1D or LXF2D). Consistency with atomic kinetics is acheived with a linearization algorithm, either with a direct solution or in an approximate operator formalism. LXF2D uses the approximate operator formalism exclusively. PRD is handled with the assumption that: (1) the redistribution is angle-averaged RIIA combined with CRD and (2) the line intensity averaged over the emission profile equals the intensity averaged over the absorption profile.

COMPUTER - IBM PC

OPERATING SYSTEMS - Any with a suitable compiler

PROGRAMMING LANGUAGES - FORTRAN 77

SOFTWARE LIMITATIONS - The primary limitations on the package arise from memory and time constraints. They have successfully handled problems including several hundred lines transferred in groups of a few dozen lines.

SOURCE CODE AVAILABLE (Y/N) - Y

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UNIQUE FEATURES - LXF1D and LXF2D can be added to existing NLTE codes. The linearization techniques used are more efficient in handling multiple interacting lines than those in common usage. The approximate operator/linearization formalism can handle many more lines simultaneously than previously feasible.

OTHER PROG/OPER SYS INFO - The user must supply linear algebra and edit subroutines as described in the documentation. Suitable linear algebra subroutines and sample edit subroutines are provided with the distribution.

HARDWARE REQS - Memory requirements vary greatly with the size of the spatial mesh and a number of frequencies used, although not with the number of lines, and range from < 1MB small problems to several hundred MB for very large problems.

TIME REQUIREMENTS - Time requirements vary greatly with the size and type of problem, and possibly with the solution technique, and range from milliseconds to minutes per package call on a 100 MFLOP computer.

REFERENCES - Documentation is provided on the source code.

ABSTRACT STATUS - Submitted February 1993. Sucessfully screened by ESTSC April 1993.

SUBJECT CLASS CODE - W

KEYWORDS -
COMPUTER PROGRAM DOCUMENTATION
L CODES
THERMAL EQUILIBRIUM
EMISSION SPECTRA
RADIATION TRANSPORT

EDB SUBJECT CATEGORIES -
990200 663600 664200

SPONSOR - DOE/DP

PACKAGE TYPE - SCREENED