

**PACKAGE ID** - 000663SUN0001 CFDLIB03.1\*

**KWIC TITLE** - Computational Fluid Dynamics Library

**AUTHORS** -

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

**COMPLETION DATE** - 07/01/2000   **PUBLICATION DATE** - 11/01/1990

**DESCRIPTION** - CFDLIB03.1\* is the Los Alamos Computational Fluid Dynamics LIBrary. This is a collection of hydrocodes using a common data structure and a common numerical method, for problems ranging from single-field, incompressible flow, to multi-species, multi-field, compressible flow. The data structure is multi-block, with a so-called structured grid in each block. The numerical method is a Finite-Volume scheme employing a state vector that is fully cell-centered. This means that the integral form of the conservation laws is solved on the physical domain that is represented by a mesh of control volumes. The typical control volume is an arbitrary quadrilateral in 2D and an arbitrary hexahedron in 3D. The Finite-Volume scheme is for time-unsteady flow and remains well coupled by means of time and space centered fluxes; if a steady state solution is required, the problem is integrated forward in time until the user is satisfied that the state is stationary.

**PACKAGE CONTENTS** - Media Directory; Software Abstract; Program note for CFDLIB03.1\*; CFDLIB USE AGREEMENT; LA-UR-93-3922; Media Includes Source Code, Auxiliary Material; Compilation Instructions, Linking Instructions; Object Module; Sample Problem Input and Output;

**SOURCE CODE INCLUDED?** - Yes

**MEDIA QUANTITY** - 1 CD ROM

**METHOD OF SOLUTION** - Cell-centered ICE method.

**COMPUTER** - SUN

**OPERATING SYSTEMS** - UNIX

**PROGRAMMING LANGUAGES** - FORTRAN 77

**SOURCE CODE AVAILABLE (Y/N)** - Y

**UNIQUE FEATURES** - Handles either compressible or incompressible flow equations. The system allows the user to stipulate 2D or 3D as needed for the codes of interest. This version includes the possibility of auto-tasking in the SGI clusters, a new improved timstp routine and a new turbulence model. Many users have grid generators capable of output in the NASA Plot3d format. CFDLIB03.1\* contains a translator for converting the Plot3d data into a form

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**UNIQUE FEATURES - (CONT)** readable by CFDLIB03.1\*, and which generates some of the CFDLIB03.1\* input data as well (see the directory/evtran in the library). For post-processing many users employ TecPlot, so the option exists to write a TecPlot-Formatted output file.

**OTHER PROG/OPER SYS INFO** - The following codes are included in this package: CAVEAT and, compressible, single-velocity, explicit Godunov hydro, van Leer advection, mixed-cell interface tracking, numerous physics packages (HE burn, compressible turbulence transport, etc.). CCMAC, incompressible, single-fluid, ALE, semi-implicit, TVD hydro. CCICE, compressible, single-fluid, ALE semi-implicit, TVD hydro. MSMAC, incompressible, multi-species, ALE, semi-implicit, TVD hydro. MSICE, compressible, multi-species, ALE, implicit, TVD hydro, optional N-species, M-reaction, gas-phase finite-rate chemical kinetics. MFMAC, incompressible, multiphase, ALE, semi-implicit, TVD hydro. MFICE, compressible, multiphase, ALE semi-implicit, TVD hydro. MFMHD, compressible, multifluid, magnetohydrodynamic, semi-implicit, TVD hydro, Lagrangean or Eulerian, N-species, M-reaction gas-phase chemical kinetics, global remapping. CFDSET, general interactive mesh generator.

**HARDWARE REQS** - Memory depends on problem size.

**REFERENCES** - J.R. Baumgardner, M.C. Cline, N.L. Johnson, and B.A. Kashiwa, CFDLIB: A Library of Computer Codes for Problems in Computational Fluid Dynamics, LA-UR-90-1361, 1990; B.A. Kashiwa, N.T. Padial, R.M. Rauenzahn, and W.B. VanderHeyden, A Cell Centered ICE Method for Multiphase Flow Simulations, LA-UR-93-3922, 1993.

**ABSTRACT STATUS** - Submitted March 23, 1994. Released screened June 24, 1994. CFDLIB03.1\* received and made available AS-IS August 2003.

**SUBJECT CLASS CODE** - H

**SPONSOR** - DOE/DP; DOD

**PACKAGE TYPE** - AS - IS