

**PACKAGE ID** - 000185CY00000 RIPPLE

**KWIC TITLE** - Fluid Dynamics with Free Surfaces

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

**COMPLETION DATE** - 06/12/1991   **PUBLICATION DATE** - 02/24/1992

**DESCRIPTION** - RIPPLE is a two-dimensional, transient, free surface incompressible fluid dynamics program. It allows multiple free surfaces with surface tension and wall adhesion forces and has a partial cell treatment which allows curved boundaries and interior obstacles.

**PACKAGE CONTENTS** - Media Directory; Software Abstract; LA-12007-MS; Media Includes Source Code, Sample Problem, Auxiliary Material, and Control Information

**SOURCE CODE INCLUDED?** - Yes

**MEDIA QUANTITY** - 1 3.5 Diskette

**METHOD OF SOLUTION** - RIPPLE simulates incompressible flows with free surfaces using the volume-of-fluid (VOF) algorithm. This technique is based on the use of donor-acceptor differencing to track the free surface across an Eulerian grid. The complete Navier-Stokes equations in primitive variables for an incompressible fluid are solved by finite differences with surface tension and wall adhesion included. Optionally the pressure equation can be solved by a conjugate residual method rather than the successive overrelaxation (SOR) method.

**COMPUTER** - CRAY

**OPERATING SYSTEMS** - COS 1.15 (Cray X-MP)

**PROGRAMMING LANGUAGES** - FORTRAN

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

**UNIQUE FEATURES** - RIPPLE is highly structured so that individual components may be easily modified to fit specific problem requirements or to accept subsequent code upgrades.

**OTHER PROG/OPER SYS INFO** - RIPPLE contains calls to several system-dependent plotting routines and a time limit routine. These are not included, and users must supply their own equivalent routines. RIPPLE can run many problems without modification, but a specific application may require changes to the logic for special inflow or outflow ports, complicated geometries, or unusual

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**OTHER PROG/OPER SYS INFO - (CONT)** conditions. These are accomplished by using the UPDATE utility.

**HARDWARE REQS** - 3 units in addition to the standard input/output units. 144,000 words of memory are required for execution on a Cray X-MP.

**REFERENCES** - Martin D. Torrey, Douglas B. Kothe, Raymond C. Mjolsness, RIPPLE: A Computer Program for Incompressible Flows with Free Surfaces, LA-12007-MS, April 1991\ Martin D. Torrey, Lawrence D. Cloutman, Raymond C. Mjolsness, and C. W. Hirt, NASA-VOF2D: A Computer Program for Incompressible Flows with Free Surfaces, LA-10612-MS, December 1985; NASA- VOF2D, NESC No. 9644, NASA-VOF2D Tape Description and Implementation Information, National Energy Software Center Note 86-71, July 6, 1986; B. Nichols, C. W. Hirt, and R. S. Hotchkiss, SOLA-VOF: A Solution Algorithm for Transient Fluid Flow with Multiple Free Boundaries, LA-8355, August 1980; R. S. Hotchkiss, Simulation of Tank Draining Phenomena with the NASA SOLA-VOF Code, LA-8163- MS, December 1979.

**ABSTRACT STATUS** - Abstract first distributed August 1991.

**SUBJECT CLASS CODE** - H

**KEYWORDS** -

COMPUTER PROGRAM DOCUMENTATION  
R CODES  
INCOMPRESSIBLE FLOW  
SURFACES  
SURFACE TENSION  
TRANSIENTS  
NAVIER-STOKES EQUATIONS

**EDB SUBJECT CATEGORIES** -  
990200 420400

**SPONSOR** - DOE/DP; NASA

**PACKAGE TYPE** - AS - IS