

PACKAGE ID - 001163SPARC00 CAPS3DV2.00

KWIC TITLE - Casting Process Simulator 3D Mold Fill and Solidification

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LIMITATION CODE -COPY **AUDIENCE CODE** - LIM

COMPLETION DATE - 06/01/1995 **PUBLICATION DATE** - 06/01/1995

DESCRIPTION - The CAPS software is a tool used to setup, simulate, and examine the results from three-dimensional filling and solidification of a sand casting.

PACKAGE CONTENTS - Media Directory; Software Abstract; Media Includes Executable, Sample Problem Input and Output, Readme File, Install Script;

SOURCE CODE INCLUDED? - No

MEDIA QUANTITY - 1 CD Rom

METHOD OF SOLUTION - The geometry is described utilizing a parametric cubic representation. The geometry is approximated by a structured grid using an automatic mesh generation module. Boundary and initial conditions are specified with respect to the original geometry and automatically linked to the approximating mesh. The simulation module uses a finite volume approach to the solution of the conservation of mass, momentum, and energy equations. The concept of Volume of Fluid is used to track the liquid-void interface. The enthalpy method is applied to model the solidification.

COMPUTER - SUN SPARC

OPERATING SYSTEMS - SunOS 4.1.3 with OpenWindows 3.0 or MOTIF, Solaris 2.3 or later with OpenWindows 3.3 or later, and HP-UX release 9.05 or HP-UX release 10.x with Xwindow System X11R5.

PROGRAMMING LANGUAGES - FORTRAN 77 (99%), C (1%)

SOURCE CODE AVAILABLE (Y/N) - N

UNIQUE FEATURES - The CAPS software models from first principles the transient, three-dimensional aspects of liquid metal as it fills a mold cavity, thermal interactions with the mold, and subsequent solidification. A visual interface and automatic structured-grid mesh generation of arbitrary geometries are also featured. A batch

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UNIQUE FEATURES - (CONT) defer feature allows improved use of computing resources.

RELATED SOFTWARE - The proprietary MCAE PATRAN package (PATRAN 2.5 from PDA Engineering) is used to build the geometry and examine the simulation results graphically. The visual interfaces utilize the commercial HOOPS graphics database system. HOOPS is available from AutoDesk or TechSoft in Germany.

OTHER PROG/OPER SYS INFO - The software dynamically allocates memory to fit the simulation. Simulation of a one mesh application has been demonstrated.

HARDWARE REQS - Hardware requirements are highly dependent upon the problem being run. As is the case with all workstation applications, problems run significantly faster if there is sufficient real memory to avoid swapping to disk. The amount of disk space required is dependent not only on problem size, but also on the amount of information (time steps) written to disk for postprocessing. The development of CAPS was carried out on a Sun SPARCstation IPC with 48 Mbytes of memory and on an HP 735 with 112 Mbytes of memory. While problems can be run with less than 100 Mbytes of disk space, operation is greatly improved when one or two Gbytes are available.

TIME REQUIREMENTS - Time is dependent upon both the problem being run and the speed and load factor of the platform being used. Actual wall clock time may vary from a few seconds to many days.

ABSTRACT STATUS - Submitted March 1997 Released AS-IS 4/30/97

SUBJECT CLASS CODE - H

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
C CODES
THREE-DIMENSIONAL CALCULATIONS
LIQUID METALS
MESH GENERATION
SOLIDIFICATION
BOUNDARY-VALUE PROBLEMS
COMPUTERIZED SIMULATION
FLOW MODELS
FORTRAN
FINITE DIFFERENCE METHOD
NAVIER-STOKES EQUATIONS
HEAT TRANSFER
FLUID MECHANICS
COOLING TIME
THERMAL ANALYSIS
VISCOUS FLOW

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SOFTWARE ABSTRACT

PAGE 3

DATE 03/08/2002

PACKAGE ID - 001163SPARC00 CAPS3DV2.00

MELTING
MANUFACTURING
MOLDING
CASTING

EDB SUBJECT CATEGORIES -
990200 360101 420400

SPONSOR - DOE/ER

PACKAGE TYPE - AS - IS