

PACKAGE ID - 000210MLTPL00 DYNA2D96*

KWIC TITLE - Explicit 2-D Hydrodynamic FEM Program

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

COMPLETION DATE - 05/01/1996 **PUBLICATION DATE** - 04/01/1992

DESCRIPTION - DYNA2D* is a vectorized, explicit, two-dimensional, axisymmetric and plane strain finite element program for analyzing the large deformation dynamic and hydrodynamic response of inelastic solids. DYNA2D* contains 13 material models and 9 equations of state (EOS) to cover a wide range of material behavior. The material models implemented in all machine versions are: elastic, orthotropic elastic, kinematic/isotropic elastic plasticity, thermoelastoplastic, soil and crushable foam, linear viscoelastic, rubber, high explosive burn, isotropic elastic-plastic, temperature-dependent elastic-plastic. The isotropic and temperature-dependent elastic-plastic models determine only the deviatoric stresses. Pressure is determined by one of 9 equations of state including linear polynomial, JWL high explosive, Sack Tuesday high explosive, Gruneisen, ratio of polynomials, linear polynomial with energy deposition, ignition and growth of reaction in HE, tabulated compaction, and tabulated.

PACKAGE CONTENTS - Media Directory; Software Abstract; Installation Guides for SUN, IBM, and SGI; UCRL-MA-110630; UCRL-MA-106172; Media Includes Source, Linking Instructions, Compilation Instructions;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 CD ROM

METHOD OF SOLUTION - A contact-impact algorithm permits gaps and sliding with friction along material interfaces. By a specialization of this algorithm, such interfaces can be rigidly tied to admit variable zoning with no need for transition regions. Spatial discretization is achieved by the use of 4-node solid elements, and the equations-of-motion are integrated by the central difference method. An interactive rezoning capability eliminates the need to terminate the calculation when the mesh becomes too distorted. Rather, the mesh can be rezoned and the calculation continued. A Jaumann stress rate formulation is used except in the orthotropic elastic and the rubber material subroutines which use Green-St.Venant strains to compute second Piola-Kirchoff stresses which transform to Cauchy stresses. The Green-Naghdi stress rate is implemented for the elastic-plastic model with kinematic hardening.

COMPUTER - MLT-PLTFM

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OPERATING SYSTEMS - UNIX, VMS

PROGRAMMING LANGUAGES - FORTRAN

SOFTWARE LIMITATIONS - Storage allocation is dynamic. The only limit is the storage capacity of the computer.

SOURCE CODE AVAILABLE (Y/N) - Y

RELATED SOFTWARE - The LLNL-developed DIGLIB graphics software used with the DEC VAX and SUN versions is included with those versions. The MAZE preprocessor can be used to generate complete input files for DYNA2D, and the compatible release of the ORION postprocessor will produce graphics output from DYNA2D binary plot file output. The soil and crushable foam, linear viscoelastic, and the rubber subroutines were adapted from HONDO and recoded for vectorization; the ignition and growth EOS was adapted from KOVEC. The forms of the first five equations of state are from KOVEC also. The implementation of the Green-Naghdi stress rate is similar to that used in NIKE2D. Similar methods in three dimensions are available in DYNA3D.

REFERENCES - R.G. Whirley, R.E. Engelmann, and J.O. Hallquist, DYNA2D, A Nonlinear, Explicit, Two-Dimensional Finite Element, Code for Solid Mechanics, User Manual, UCRL-MA-110630, April, 1992; John O. Halquist, T. Spelce, R.G. Whirley, A Material Model Driver for DYNA2D, UCRL-MA-106172, September 1990.

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SUBJECT CLASS CODE - I

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
D CODES
TWO-DIMENSIONAL CALCULATIONS
AXIAL SYMMETRY
ELASTICITY
PLASTICITY
DEFORMATION
SOLIDS

EDB SUBJECT CATEGORIES -

990200 420200 665000

SPONSOR - DOE/DP

PACKAGE TYPE - SCREENED