

# NUMERICAL MODELING OF EXPLOSIVES AND PROPELLANTS 2015 DVD CONTENTS

## COMPUTER CODES for MODELING EXPLOSIVES and PROPELLANTS on PERSONAL COMPUTERS

### *BASIC PROGRAMS*

- **BKW** Code for computing detonation performance
- **USERBKW** Code for helping the user develop input BKW files
- **SIN** Code for one dimensional modeling of explosive hydrodynamics
- **USERSIN** Code for helping the user develop input SIN files
- **GLAW** Code for computing gamma law equation of state for HE

### *SUPPORT PROGRAMS*

- **TDF** Code for computing thermodynamic functions for BKW
- **SEQS** Code for computing single shock Hugoniot temperatures  
Forms fits required by HOM equation of state in FIRE, SIN, TDL, 2DE and NOBEL  
Forms fits required for solid products in BKW code
- **FIRE** Code for computing Forest Fire rate of decomposition of  
shocked heterogeneous explosives and propellants.  
Forms decomposition rate fits for SIN, TDL, 2DE and NOBEL codes

### *PROPELLANT PERFORMANCE CODE*

- **ISPBKW** Code for computing propellant performance

This code calculates the propellant temperature, specific volume, enthalpy and entropy for the combustion chamber and the exhaust. The Specific Impulse (ISP) of the propellant is calculated.

### *TWO DIMENSIONAL LAGRANGIAN HYDRODYNAMIC CODE*

- **TDL** Code for computing reactive hydrodynamic flow

This code calculates reactive hydrodynamic flow with chemical reactions described by an Arrhenius law, C-J volume burn, sharp-shock burn, or the Forest Fire heterogeneous shock initiation burn. Elastic- plastic flow and spallation are included in the description of solids. Files are furnished with equation of state and Forest Fire rate constants.

- **USERTDL** Code for helping the user develop input TDL files

### *EULERIAN HYDRODYNAMIC CODES*

- **2DE** Code for computing reactive hydrodynamic flow in Eulerian geometry

### *GENERAL INFORMATION*

The WINDOWS directory contains versions of the codes using ABSOFT FORTRAN with PLPLOT graphics for Windows 95, 98, ME, XP, VISTA and Windows 7.

The NT directory contains versions of the codes without graphics that will operate under the Windows NT operating system.

*The DOS directory contains the original versions of the codes with 16 bit MCGRAPH graphics for the IBM OS/2, DOS or DOS Windows of Windows 95, 98, XP. The DOS codes will work using the DOSBox-0.72 program with the VISTA operating system or the Windows 7 operating system.*

The IMAC directory contains versions of the codes using ABSOFT FORTRAN with PLPLOT graphics for Apple IMAC System OS X.

ANIMATIONS

Aquarium Test - NOBEL Calculation

AQUAR.MVE - A Cylinder of PBX-9502 in Water

Failure Diameter - NOBEL Calculation with Forest Fire

FDIA.MVE - 0.6 and 0.3 cm Dia PBX-9502 Cylinders

Homogeneous Shock Initiation of Nitromethane - SIN Calculation

NM.MVE - 90 kbar Shock Initiation of Nitromethane

Heterogeneous Shock Initiation of PBX-9502 - SIN Calculation

FOREST.MVE - Forest Fire Burn of PBX-9502

Flying Aluminum Foil Initiation of PBX-9404 - SIN Calculation

FFOIL.MVE - Short Shock Pulse Initiation of PBX-9404

Energy From Shocked But Not Detonated PBX-9404 - SIN Calculation

FFENG.MVE - 30 Kbar, 0.64 cm 9404, 0.2 cm Plexiglas

PBX-9404 Shocking an Aluminum Plate - SIN Calculation

9404Al.MVE - 5 cm PBX-9404/1 cm Aluminum

PBX-9404 Shocking a Steel Plate - SIN Calculation

9404FE.MVE - 5 cm PBX-9404/1 cm Steel

PBX-9404 Shocking a Plexiglas Plate - SIN Calculation

9404PXG.MVE - 5 cm PBX-9404/1 cm Plexiglas

A Sphere of PBX-9404 Shocking an Aluminum Hemisphere - A SIN Calculation

CONVERG.MVE - Converging 5 cm PBX-9404/1 cm Aluminum/4 cm Air

Diverging PBX-9404 Shocking an Aluminum Hemisphere - A SIN Calculation

DIVERG.MVE - Diverging 5 cm PBX-9404/1 cm Aluminum/4 cm Air

An Aluminum Driver Shocking an Aluminum Target - SIN Calculation

ALAL.MVE - 0.5 cm Al Target at 0.1 cm/ $\mu$ sec/1 cm Al Target

An Aluminum Driver Shocking a Plexiglas Target - SIN Calculation

ALPXG.MVE - 0.5 cm Al Target at 0.1 cm/ $\mu$ sec/1 cm Plexiglas Target

An Aluminum Driver Shocking a Gold Target - SIN Calculation

ALAU.MVE - 0.5 cm Al Target at 0.1 cm/ $\mu$ sec/1 cm Gold Target

An Aluminum Driver Shocking an Aluminum Target with Strength - SIN Calculation

ALALEP.MVE - 0.3 cm Al Target at 0.04 cm/ $\mu$ sec/1.2 cm Al Target

High Pressure Steam Shocking Air - SIN Calculation

STEAM.MVE - 1000 psi Steam Shocking Air -Slab, Cylinder, Spherical Geometry

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Corner Turning - NOBEL Calculation

CORNER.MVE - PBX-9502 Detonation Wave Corner Turning

Detonation Failure From Preshocking - NOBEL Calculation

DESEN.MVE - Desensitization of PBX-9502 by a 50 kbar Preshock and Failure

Steel Jet Penetration of Steel - NOBEL Calculation

FEJET.MVE - Steel Rod moving 1.0 cm/ $\mu$ sec Penetrating Steel

Steel Jet Penetration of Aluminum - NOBEL Calculation

FEALJET.MVE - Steel Rod moving 1.0 cm/ $\mu$ sec Penetrating Aluminum

Jet Initiation of Explosives - NOBEL Calculation

FEHE.MVE - Jet Initiation of Composition B by a Steel Rod Projectile

Explosive Desensitization by Jet Bow Shock Wave - NOBEL Calculation

FEFEHE.MVE - Steel Jet/Steel Barrier/Comp B - Forest Fire

JETMSFF.MVE - Steel Jet/Steel Barrier/Comp B - MSFF

Plate Dent Experiment - NOBEL Calculation

PDENT.MVE - A Detonating PBX-9404 Cylinder Denting A Steel Plate

Resolved Reaction Zones - SIN Calculation

RXZONE.MVE\PISTON - Piston Driven Nitromethane Reaction Zones

RXZONE.MVE\INIT - Nitromethane Shock Initiation

RXZONE.MVE\RXPIST - Stable and Unstable Nitromethane Detonations

RXZONE.MVE\9404 - Stable PBX-9404 Detonation

Unresolved Reaction Zone Detonation Wave - SIN Calculation

VISC.MVE - Viscosity Effect on Unresolved Explosive Burns

Deflagration to Detonation Transition - SIN Calculation

DDT.MVE - Burning to Detonation using Bulk Burn/MSFF

Plane Wave Lens - TDL Calculation

P100.MVE - TNT/PBX-9501 Plane Wave Lens

Hemispherical Detonator - NOBEL Calculation

DET.MVE - 9404 Detonator Initiation of PBX-9502

DATA FILES IN WINDOWS Directory

- **USERBKW\ZZZTHERC** - Thermodynamic Fit Coefficients  
for Detonation Products
- **USERBKW\ZZZSOLEQS** - Cowan Equation of State Constants  
for Solid Detonation Products
- **USERBKW\ZZZCOMPS** - Explosive and Binder Composition, Density,  $\Delta H_f^o$
- **SIN\EOSDATA** - HOM Equation of State Constants
- **SIN\FFDATA** - Forest Fire Rate Constants
- **TDF\TDFFILES** - Thermodynamic Gas and Solid Parameters
- **SEQ\SEQSFILES** - Solid Equation of State Parameters
- **DATA\ HUGDATA** - Shock Hugoniot Data from LASL Shock Hugoniot Data Volume  
HUG Data Processing and Graphing Code
- **DATA\ AQUARDAT** - Aquarium Data from  
Los Alamos Explosive Property Data Volume  
AQUAR Data Processing and Graphing Code

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MISCELLANEOUS

- **MISC\JWL** - Code for Generating JWL Coefficients from HOM Fits
- **MISC\EDITOR** - A Line Editor for DOS and DOS Windows
- **MISC\DETSYP** - Index to Detonation Symposiums  
Includes Explosive Composition Index
- **WINDOWS\MATCH** - Shock Matching Code
- **MISC\HOM** - HOM Material Constants

LOS ALAMOS DYNAMIC MATERIAL PROPERTIES DATA VOLUMES

- **DATAVOL.PDF\SHD.PDF** - LASL Shock Hugoniot Data
- **DATAVOL.PDF\SWP.PDF** - Los Alamos Shock Wave Profile Data
- **DATAVOL.PDF\EPER.PDF** - Los Alamos Explosive Performance Data
- **DATAVOL.PDF\EPRO.PDF** - LASL Explosive Property Data
- **DATAVOL.PDF\PH1.PDF** - LASL PHERMEX Data - Volume 1
- **DATAVOL.PDF\PH2.PDF** - LASL PHERMEX Data - Volume 2
- **DATAVOL.PDF\PH3.PDF** - LASL PHERMEX Data - Volume 3

RUSSIAN FEDERAL NUCLEAR CENTER DATA VOLUME

- **DATAVOL.PDF\TRUNIN.PDF** - Russian Shock Wave Data

SHORT COURSE POWERPOINTS

- **CLASS.PPT\CHAPT1** - Chapter 1 - Reaction Zones
- **CLASS.PPT\CHAPT2** - Chapter 2 - HE Performance
- **CLASS.PPT\CHAPT3** - Chapter 3 and 4 - Initiation
- **CLASS.PPT\CHAPT5** - Chapter 5 - Applications
- **CLASS.PPT\HYDRO** - Appendix A thru D - Codes
- **CLASS.PPT\HETECH** - HE Technology
- **CLASS.PPT\SHOCK** - Shock Wave Physics
- **CLASS.PPT\APEXP** - 5/1998 Ammonium Perchlorate Exposition
- **CLASS.PPT\ANEXP** - Ammonium Nitrate Exposions
- **CLASS.PPT\LASLACCIDENTS** - Los Alamos Scientific Laboratory Accidents
- **NOBEL** - NOBEL Powerpoints - Chapter 6
  - **\BUNOBEL** - Build-Up TO and OF Detonation
  - **\COLLID** - Colliding Detonations and PRAD Radiographs
  - **\CAVITY** - Explosively Generated Cavities
  - **\MUNROE** - Munroe Jets
  - **\JET** - Shaped Charge Jet
  - **\ARC** - Detonation Around an Arc.
  - **\CONE** - Explosive Cones
  - **\KRAKATOA** - Hydrovolcanic Explosions
  - **\CRATER** - Moon, Arizona Meteor and SEDAN Nuclear Craters
  - **\OBLIQUE** - Oblique Initiation of IHE
  - **\DESENSITIZATION** - Jet Desensitization of Comp B
  - **\ CARBONCOND** - Carbon Condensation in Detonation Products

**CNMEP3.PDF** is a searchable PDF file of the book *Numerical Modeling of Explosives and Propellants - Third Edition* with many figures in color.