NUMERICAL MODELING OF EXPLOSIVES AND PROPELLANTS
CD-ROM 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 and TDL
  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 and TDL codes

PROPELLANT PERFORMANCE CODE

- **ISPBKW** Code for computing propellant performance

This code calculates the propellant temperature, specific volume, enthalphy 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 and 3DE** Codes for computing reactive hydrodynamic flow

GENERAL INFORMATION

The WINDOWS directory contains versions of the codes for ABSOFT FORTRAN with PLPLOT graphics for Windows 95, 98, ME, XP and VISTA. The NT directory contains versions of the codes without graphics that will operate under the Windows NT operating system.

The IMAC directory contains versions of the codes for 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 Plate - A SIN Calculation
CONVERG.MVE - Converging 5 cm PBX-9404/1 cm Aluminum/4 cm Air

A Sphere of PBX-9404 Shocking an Aluminum Plate - 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/μsec/1 cm Al Target

An Aluminum Driver Shocking a Plexiglas Target - SIN Calculation
ALPXG.MVE - 0.5 cm Al Target at 0.1 cm/μsec/1 cm Plexiglas Target

An Aluminum Driver Shocking a Gold Target - SIN Calculation
ALAU.MVE - 0.5 cm Al Target at 0.1 cm/μsec/1 cm Gold Target

An Aluminum Driver Shocking an Aluminum Target - SIN Calculation
ALALEP.MVE - 0.3 cm Al Target at 0.04 cm/μsec/1.2 cm Al Target

High Pressure Steam Shocking Air - SIN Calculation
STEAM.MVE - 1000 psi Steam Shocking Air -Slab, Cylinder, Sphere

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/μsec Penetrating Steel

Steel Jet Penetration of Aluminum - NOBEL Calculation
FEALJET.MVE - Steel Rod moving 1.0 cm/μsec Penetrating Aluminum

Jet Initiation of Explosives - NOBEL Calculation
FEHE.MVE - Jet Initiation of Composition B by a Steel Rod

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, ΔH_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

MISCELLANEOUS

- **MISC\JWL** - Code for Generating JWL Coefficients from HOM Fits
- **MISC\EDITOR** - A Line Editor for DOS and OS/2
- **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
- **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

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