NDIA

WARHEADS AND BALLISTICS CLASSIFIED SYMPOSIUM

July 30 – August 2, 2018

Naval Postgraduate School

Monterey, CA

NDIA.org/WarheadsBallistics18

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NDIA

WHO WE ARE

The National Defense Industrial Association is the trusted leader in defense and national security associations. As a 501(c)(3) corporate and individual membership association, NDIA engages thoughtful and innovative leaders to exchange ideas, information, and capabilities that lead to the development of the best policies, practices, products, and technologies to ensure the safety and security of our nation. NDIA's membership embodies the full spectrum of corporate, government, academic, and individual stakeholders who form a vigorous, responsive, and collaborative community in support of defense and national security. For more information, visit **NDIA.org**

LEADERSHIP AND COMMITTEES

Robert D. Ciccarelli
Division Chair

James Miller
Vice Chair

BOMB AND WARHEADS DIVISION

WHO WE ARE

The Bomb & Warhead Division encourages the development and fielding of improved military capabilites and the defense industrial base necessary to these accomplisments. It also provides a forum for the exchange of technical concepts, design techniques and test and evaluation data related to bombs, warheads and both kinetic energy and explosive munitions of all types, includig those used against armor, ships, aircraft, submarines, structures and vehicles. The recognition of leadership and technical contributions in warhead technology also is part of the division's mission. Major areas of concern include warhead technology, warhead/target interaction methodology, advanced projectiles, counters to active protection systems, modeling and simulation, testing innovations, chemical energy, kinetic energy penetrator technologies, terminal ballistics, quantification of terminal effects benefits and multipurpose warheads.

SCHEDULE AT A GLANCE

MONDAY, JULY 30

Registration & Reception
Hilton Garden Inn Monterey
5:00 - 6:30 pm

TUESDAY, JULY 31

Registration & Security Check-in
Glasgow Hall Courtyard
7:00 – 8:00 am

General Session & Keynote Speaker
8:00 – 9:00 am

Session I: Ballistics
9:00 – 10:45 am

Session II: Energetics – Reactive Materials
10:45 am – 3:25 pm

Session III: Warhead Technology – Shaped Charge and EFP
3:25 – 5:10 pm

Reception
Hilton Garden Inn Monterey
5:30 - 7:00 pm

WEDNESDAY, AUGUST 1

Registration & Security Check-in
Glasgow Hall Courtyard
7:00 – 8:00 am

Session IV: Warhead Technology – Blast
8:05 – 10:25 am

Session V: Warhead Technology – Fragmentation
10:25 am – 2:50 pm

Session VI: Protection Systems
2:50 – 5:15 pm

THURSDAY, AUGUST 2

Registration & Security Check-in
Glasgow Hall Courtyard
7:00 – 8:00 am

Session VII: Energetics – Explosives and Propellants
8:05 – 10:45 am

EVENT INFORMATION

LOCATION
Naval Postgraduate School
1 University Circle
Monterey, CA 93943

EVENT WEBSITE
NDIA.org/WarheadsBallistics18

ATTIRE
Civilian: Business
Military: Uniform of the day

SURVEY AND PARTICIPANT LIST
You'll receive via email a survey and list of attendees (name and organization) after the conference. Please complete the survey, which helps make our event even more successful in the future.

EVENT CONTACT
Ms. Meredith Mangas
Associate Director, Meetings
(703) 247-9467
mmangas@ndia.org

SPEAKER GIFTS

In lieu of speaker gifts, a donation is being made to the Fisher House Foundation.

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AGENDA

MONDAY, JULY 30

5:00 – 6:30 pm

REGISTRATION AND RECEPTION

HILTON GARDEN INN MONTEREY

TUESDAY, JULY 31

7:00 – 8:00 am

REGISTRATION AND SECURITY CHECK-IN

NAVAL POSTGRADUATE SCHOOL, GLASGOW HALL COURTYARD

8:00 – 8:15 am

INTRODUCTORY REMARKS

GLASGOW 102

James Miller
Dynetics
Meeting Co-Chair

Robert D. Ciccarelli
DE Technologies, Inc.
Meeting Co-Chair

8:15 – 9:00 am

KEYNOTE ADDRESS

Got Weapons? - The Weapons Technologies Community of Interest

David E. Lambert
U.S. Air Force Research Laboratory

SESSION I: BALLISTICS

9:00 – 9:05 am

SESSION INTRODUCTION

GLASGOW 102

Timothy Holmquist
Southwest Research Institute

Session Chair

9:05 – 9:25 am

MULTI-PHYSICS SIMULATIONS FOR THE NATION'S FUTURE

Chad R. Noble
Lawrence Livermore National Laboratory

9:25 – 9:45 am

MODELING THE IMPACT RESPONSE OF A CONCRETE TARGET SUBJECTED TO TWO IMPACTS

Timothy Holmquist
Southwest Research Institute

Gordon Johnson

9:45 – 10:05 am

NOVEL, PENETRATION-EFFICIENT KINETIC ENERGY PROJECTILES

Lee S. Magness
U.S. Army Research Laboratory

Timothy Cler • Daniel Scheffler • Brett Sorensen

10:05 – 10:25 am

LAYER COUNTING AND HIGH SPEED DISTRIBUTED EMBEDDED FUZE SYSTEMS (DEFS) ADVANCES

Jacob C. Dodson
U.S. Air Force Research Laboratory

Alain Beliveau • George Jolly • Curtis McKinion

10:25 – 10:45 am

COFFEE BREAK

GLASGOW HALL COURTYARD

SESSION II: ENERGETICS – REACTIVE MATERIALS

10:45 – 10:50 am

SESSION INTRODUCTION

GLASGOW 102

Matthew Beyard
Office of Naval Research
Session Chair

David Cooke
PEO - IWS
Session Chair

10:50 – 11:20 am

UPDATE ON REACTIVE MATERIAL STRUCTURES: LOWER-DENSITY VARIANTS

Maurice Grudza
DE Technologies, Inc.

William J. Flis • D.L. Jann • H.L. Lam • E.C. Molengraft

11:20 – 11:40 am

ADVANCED WARHEAD EFFECTS: MULTI-SCALE, MECHANICAL/ CHEMICAL MODELS OF REACTIVE MATERIAL STRUCTURES (RMS)

Daniel Bentz
Enig Associates, Inc.

M.J. Barnard • J. Dunn • E.N. Enig • M.A. Lyman

11:40 am – 12:00 pm

BLAST CHARACTERIZATION OF LOW-DENSITY REACTIVE MATERIALS IN A MULTI-ROOM TARGET

Stephen D. Thornton
U.S. Air Force Research Laboratory

Jason E. Darr • Mark W. Heyse • Donald M. Littrell • Alan P. Ohrt • John W. Rogers • Tony F. Zahrah

12:00 – 1:05 pm

LUNCH

HERMANN HALL BALLROOM

1:05 – 1:25 pm

GUN LAUNCHED HOT REACTIVE FRAGS

GLASGOW 102

Christopher J. Freitas
Southwest Research Institute

Michael Denigan • Matthew V. Grimm

1:25 – 2:05 pm

EXPERIMENTAL AND COMPUTATIONAL INVESTIGATIONS OF REACTIVE MATERIAL IMPACT & COMBUSTION

Anne Kyner
NSWC Indian Head Explosive Ordnance Disposal Technology Division

Thomas McGrath
NSWC Indian Head Explosive Ordnance Disposal Technology Division

Alexandra Reinert
NSWC Indian Head Explosive Ordnance Disposal Technology Division

John LaSala • R. Lee • J. Warner

2:05 – 2:25 pm

THE SHATTERING VELOCITY OF REACTIVE MATERIAL FRAGMENTS

Joseph P. Hooper
Naval Postgraduate School

2:25 – 2:45 pm

DEVELOPMENT OF A DETAILED PREDICTIVE MODEL FOR TRITONAL FILLED MK 84 BOMBS

Paul Braithwaite
Northrop Grumman Innovation Systems

Robert Hatch • Dave Johnson • Erik Johnson • Brian Lanigan

2:45 – 3:05 pm

IGNITION AND GROWTH REACTIVE FLOW MODEL AND MESH RESOLUTION SENSITIVITY

Olesya V. Berenbak
Practical Energetics Research, Inc.

Todd A. Dutton • Drew C. Marable • Justin C. Sweitzer

3:05 – 3:25 pm

COFFEE BREAK
GLASGOW HALL COURTYARD

SESSION III: WARHEAD TECHNOLOGY – SHAPED CHARGE AND EFP

3:25 – 3:30 pm

SESSION INTRODUCTION
GLASGOW 102

Eric VanderMolen
Northrop Grumman Innovation Systems
Session Chair

3:30 – 3:50 pm

ROBUST COMPACT SHAPED CHARGE DEMONSTRATION

Gabe Bonnstetter
Northrop Grumman Innovation Systems

3:50 – 4:10 pm

TANDEM INTEGRATION EVOLUTION OF THE JAVELIN MISSILE SYSTEM AND LESSONS LEARNED

Nicholas R. Peterson
U.S. Army Aviation & Missile Research, Development & Engineering Center

Scott D. Hill • David Simmons • Justin C. Sweitzer

4:10 – 4:30 pm

COLLABORATIVE WARHEAD LETHALITY AGAINST ARMORED TARGETS

Brett R. Sorensen
U.S. Army Research Laboratory

Jodi Robertson

4:30 – 4:50 pm

INHIBITING THE SHAPED CHARGE JET

Richard Mudd
U.S. Army Research Laboratory

William Clark • Michael Keele

4:50 – 5:10 pm

TESTING AND MODELING OF A 4 INCH DIAMETER IMPROVISED EXPLOSIVELY DRIVEN PENETRATOR

Stanley Defisher
U.S. Army RDECOM-ARDEC

Gregory Stunzenas

5:10 pm

ADJOURN

5:30 – 7:00 pm

RECEPTION

HILTON GARDEN INN MONTEREY

WEDNESDAY, AUGUST 1

7:00 – 8:00 am

REGISTRATION AND SECURITY CHECK-IN

NAVAL POSTGRADUATE SCHOOL, GLASGOW HALL COURTYARD

SESSION IV: WARHEAD TECHNOLOGY – BLAST

8:00 – 8:05 am

SESSION INTRODUCTION

GLASGOW 102

Chi L. Mai
U.S. Air Force Research Laboratory
Session Chair

8:05 – 8:25 am

DEVELOPMENT OF AN AFFORDABLE SCALED TEST TO STUDY BLAST EFFECTS FROM HYPERSONIC WEAPONS

Rob Witham
Lawrence Livermore National Laboratory

William Elmer • David Hare • Michael Hargather

8:25 – 8:45 am

A NUMERICAL STUDY OF DISTRIBUTED BLAST USING MULTIPLE CODES

Matthew P. Clay
U.S. Air Force Research Laboratory

Margaret L. Heck • Pedro A. Lopez-Fernandez • Brain D. Taylor

8:45 – 9:05 am

AN EXPERIMENTAL INVESTIGATION OF SIMULTANEOUS AND INDEPENDENT DETONATIONS OF DISTRIBUTED CHARGES IN A BUNKER TARGET

Sarah Folse
U.S. Air Force Research Laboratory

Roosevelt Davis • Alan Ohrt

9:05 – 9:25 am

SIMULATIONS AND EXPERIMENTS OF COLLABORATIVE BLAST FROM MULTIPLE CYLINDRICAL CHARGES

Chi L. Mai
U.S. Air Force Research Laboratory

Brian D. Taylor
U.S. Air Force Research Laboratory

Michael J. Hargather • Brandon C. Paikoff • Suhithi M. Peiris • Stephen D. Thornton • Kyle O. Winter

9:25 – 9:45 am

ANALYSIS OF MACH STEM FORMATION IN REFLECTING AND MULTIPLE-INTERACTING EXPLOSIONS FOR ENHANCED BLAST EFFECTS

Michael J. Hargather
New Mexico Institute of Mining and Technology

Chi L. Mai • Suhithi M. Peiris • Kyle O. Winter

9:45 – 10 :05 am

VARIATIONS IN OPEN AIR BLAST PERFORMANCE FROM LEGACY WEAPON SYSTEMS

Thomas J. Hatch-Aguilar
Naval Air Warfare Center

David Johnson • Brian Lanigan

10:05 – 10:25 am

COFFEE BREAK

GLASGOW HALL COURTYARD

SESSION V: WARHEAD TECHNOLOGY – FRAGMENTATION

10:25 – 10:30 am

SESSION INTRODUCTION

GLASGOW 102

Greg Johnson
U.S. Army AMRDEC
Session Chair

David Pfau
U.S. Army RDECOM-ARDEC
Session Chair

10:30 – 10:50 am

MEDIUM CALIBER FRAGMENTATION WARHEAD DESIGN

James Grzybek
U.S. Army RDECOM-ARDEC

Deepak Kapoor • David Pfau • Jack Pincay

10:50 – 11:10 am

3D FRAGMENT TRACKING AND ANALYSIS FROM PIPE BOMBS

Thomas J. Hatch-Aguilar
Naval Air Warfare Center

Douglas Barnes • Michael J. Platt

11:10 – 11:30 am

DESIGN, SIMULATION, AND TESTING OF A SELECTABLE FRAGMENT LETHALITY WARHEAD

John Granier
Energetic Materials & Products

Mike Adams • Paul Braithwaite • Mike Gunger • Donald Littrell • Chi L. Mai • Justin Shelton • Dennis Wilson

11:30 – 11:50 am

AIR FORCE LEO SDB AREA ATTACK DEVELOPMENT

Eric Volkmann
Northrop Grumman Innovation Systems

11:50 am – 12:10 pm

CONFORMAL PANEL WARHEAD FOR HIGH-SPEED AIR-TO-GROUND MISSILES

Michael Denigan
U.S. Air Force Research Laboratory

Tim Beets • John Granier • Michael Hopson • Michael Murphy • Ronak Patel • Eric Scarborough

12:10 – 1:10 pm

LUNCH

HERMANN HALL BALLROOM

1:30 – 1:50 pm

USE OF MODELING AND SIMULATION TO DESIGN A MISSILE WARHEAD

GLASGOW 102

Mitchell L. Moffet
Raytheon

Brian A. Brackney • Scott D. Hill • Kimberly Williams

1:50 – 2:10 pm

DYNAMIC ARENA TESTS FOR A DISPENSING WARHEAD PROJECTILE

Justin Peters
Johns Hopkins University Applied Physics Laboratory

Ryan Decker • David Maurizi

2:10 – 2:30 pm

AEROSTABLE PENETRATOR TECHNOLOGY DETONATION TESTING

David Bittle
U.S. Army RDECOM-ARDEC

2:30 – 2:50 pm

COFFEE BREAK

GLASGOW HALL COURTYARD

SESSION VI: PROTECTION SYSTEMS

2:50 – 2:55 pm

SESSION INTRODUCTION

GLASGOW 102

Ed Kennedy
U.S. Army Research Laboratory
Session Chair

2:55 – 3:15 pm

COMPUTATIONAL DESIGN AND OPTIMIZATION OF ANTI-FRATRICIDE BARRIERS FOR 155MM ARTILLERY PROJECTILES

Kevin Miers
U.S. Army RDECOM-ARDEC

Nausheen Al-Shehab • Jacek Foltynski • Keyur Patel • Daniel Pudlak

3:15 – 3:35 pm

VALIDATION OF COMPUTATIONAL SIMULATION MODELS FOR M993 IMPACT ON CERAMIC/COMPOSITE PPE ARMOR

Christopher J. Freitas
Southwest Research Institute

Rory P. Bigger • Matthew V. Grimm

3:35 – 3:55 pm

AN EVALUATION OF A GLASS-BASED ARMOR FOR COMBAT VEHICLE PROTECTION USING A COMPACT CONFIGURATION

David S. Kleponis
U.S. Army Research Laboratory

Brian H. Kariya

3:55 – 4:15 pm

HYBRIDIZING GLASS AND EXPLOSIVE ARMOR TECHNOLOGIES FOR SHAPED CHARGE JET DEFEAT

Valerie S. Wagoner
U.S. Army Research Laboratory

David S. Kleponis

4:15 – 4:35 pm

PROOF-OF-CONCEPT SYSTEMS FOR TUNABLE RESPONSE FROM EXPLOSIVE REACTIVE ARMOR

Joel B. Stewart
U.S. Army Research Laboratory

James S. Anderson • Collin R. Pecora • Robert J. Spink • Michael B. Zellner

4:35 – 4:55 pm

PENETRATION OF SPACED PLATE TARGETS BY TOP ATTACK EXPLOSIVELY FORMED PENETRATORS

Stephen J. Schraml
U.S. Army Research Laboratory

David S. Kleponis • Kirk A. Stoffel

4:55 – 5:15 pm

EVALUATION OF ARMOR ABSORBER MATERIALS USING A CONDITIONED EXPLOSIVELY FORMED PENETRATOR (EFP) PARTICLE SURROGATE

Kirk A. Stoffel
U.S. Army Research Laboratory

Michael J. Keele

5:15 PM

ADJOURN

THURSDAY, AUGUST 2

7:00 – 8:00 am

REGISTRATION AND SECURITY CHECK-IN
NAVAL POSTGRADUATE SCHOOL, GLASGOW HALL COURTYARD

SESSION VII: ENERGETICS – EXPLOSIVES AND PROPELLANTS

8:00 – 8:05 am

SESSION INTRODUCTION
GLASGOW 102

Scott D. Hill
Practical Energetics Research, Inc.
Session Chair

8:05 – 8:25 am

ADVENT OF NOVEL PERFECT PROPELLANT GRAINS: THEIR IMPLICATIONS AND POSSIBLE MANUFACTURE

Paul Conroy
U.S. Army Research Laboratory

Andrew Gaynor • Jason Robinette • John Schmidt • Ray Wildman

8:25 – 8:45 am

DEMONSTRATION OF DUAL-MODE ROCKET MOTOR FOR TARGET DEFEAT

Geremy Kleiser
U.S. Air Force Research Laboratory

Roderick Daebelliehn • Nicholas McGuire

8:45 – 9:05 am

ANALYSIS OF CHEMICAL KINETICS BEHAVIOR TOWARDS ENHANCED INSENSITIVE MUNITIONS PERFORMANCE IN COMPOSITE BILLETS

Drew C. Marable
Practical Energetics Research, Inc.

Scott D. Hill • Justin C. Sweitzer

9:05 – 9:25 am

MODELING AND EXPERIMENTAL RESULTS OF EXPLOSIVELY OVERDRIVEN CHARGES

Todd A. Dutton
Practical Energetics Research, Inc.

Olesya V. Berenbak • Scott D. Hill • Darin L. Kielsmeier

9:25 – 9:45 am

DEVELOPMENT AND TESTING OF NANOPARTICLE CL-20 LOW ENERGY EXPLODING FOIL INITIATOR INPUT PELLETS FOR IMPROVED SHOCK INITIATION

Jesse Tobin
Naval Air Warfare Center

Jonathan Essel • Andrew Ihnen • Mark Mason • Christopher Nance • Rick Reynolds

9:45 – 10:05 am

PHOTON DOPPLER VELOCIMETRY (PDV) CHARACTERIZATION OF 40MM SPITBACK CONFIGURATIONS FOR BASELINE PERFORMANCE AND IMPROVEMENT

David Rydzewski
U.S. Army RDECOM-ARDEC

10:05 – 10:25 am

ESTIMATION OF HUGH JAMES CRITERIA FROM IMPACT TESTS

Justin C. Sweitzer
Practical Energetics Research, Inc.

Nausheen Al-Shehab • Nicholas R. Peterson

10:25 – 10:45 am

COMPARISON OF EXPLOSIVE CANDIDATES FOR AN ANTI-STRUCTURE M72 SHOULDER FIRED SYSTEM

Matt O'Neal
Nammo Talley

A. Davis • D. Jezierski • K. Mychajlonka

10:45 am

ADJOURN

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