

# The 76<sup>th</sup> Shock & Vibration Symposium

## *Preliminary Program*



**US Army Corps of Engineers**  
Engineer Research and Development Center



**WEIDLINGER ASSOCIATES® INC**  
CONSULTING ENGINEERS



**October 30 - November 3, 2005  
New Orleans, LA**

## **Introduction**

Since the first meeting in 1947, the Shock and Vibration Symposium has become the oldest, continual meeting dealing with the transient response of structures and materials to vibration and shock. The symposium was created as a mechanism for the exchange of information among government agencies concerned with design, analysis and testing. It provides a valuable opportunity for the technical community in government, private industry and academia to meet and discuss problems of mutual interest. This year's symposium features the US Army Engineer Research & Development Center (ERDC), the Defense Threat Reduction Agency (DTRA), Weidlinger Associates, Inc., and MSC.Software. Representing these organizations are our Co-Chairs.

## **Program Committee Members**

**Co-Chair: Dr. Bob Welch - SAVIAC Director/USACE ERDC**  
**Co-Chair: Mr. Michael Giltrud - Defense Threat Reduction Agency**  
**Co-Chair: Dr. Raymond P. Daddazio - Weidlinger Associates, Inc.**  
**Co-Chair: Co-Chair: Mr. Bart McPheeters - MSC.Software**

Mr. Ed Alexander - United Defense LP  
Mr. Austin Alvarez - General Dynamics Electric Boat  
Mr. George Camp - Bath Iron Works  
Mr. Frederick Costanzo - Naval Surface Warfare Center Carderock Division  
Mr. Sal Detroit - National Technical Systems  
Mr. Karl D'Souza - ABAQUS, Inc.  
Mr. Tim Edwards - Sandia National Laboratories  
Mike Hale - Redstone Technical Test Center  
Mr. James Howell III - Naval Surface Warfare Center, Dahlgren Division  
Mr. Travis Kerr - Northrop Grumman Newport News  
Mr. Bob Krezel - HI-TEST Laboratory, Inc.  
Mr. Joel Leifer - SAVIAC  
Dr. Paul Mlakar - US Army Engineer Research & Development Center  
Mr. Jeffery Morris - HI-TEST Laboratories, Inc.  
Dr. Reed Mosher - US Army Engineer Research & Development Center  
Mr. Jon Pasckvale - Naval Undersea Warfare Center Keyport Division  
Mr. Allen Parkes - Naval Surface Warfare Center Crane Division  
Mr. Drew Perkins - HI-TEST Laboratories, Inc.  
Mr. Henry Pusey - MFPT/SAVIAC  
Dr. Rudy Scavuzzo - University of Akron  
Mr. Jim Sullivan - PCB Piezotronics Inc.  
Ms Margaret Tang - Weidlinger Associates, Inc.  
Prof Patrick Walter - PCB Piezotronics Inc./TCU  
Mr. David B - Watts, Air Force Research Laboratory  
Mr. Bill Yancey - HI-TEST Laboratories  
Mr. Gary Zook - Naval Undersea Warfare Center Keyport Division

## **Classified Sessions**

A SECRET-level clearance is required to attend the Limited/Classified Sessions held at Corps of Engineers New Orleans District. A visit request form (included in this program) must be sent to ERDC by October 9, 2005. Please bring a photo ID for admittance.

## **Note to Speakers**

Please be aware this is a preliminary program. We have tried to arrange the presentations to minimize conflicts. If you have a conflict resulting from the arrangements as presented here, please contact us for possible changes. For up-to-date program status, check the SAVIAC website at <http://www.saviac.org>.

## **Exhibitors**

There will be an area for table-top and/or booth exhibits at the hotel. We will be having an Exhibitor's Luncheon on Tuesday for all attendees and exhibitors. In addition, all session breaks will be held in the exhibit area. Please call Darnise Johnson (301) 596-0100 for further information.

## **Information Numbers**

Joel Leifer (Technical Info)	(301) 596-0100	The Royal Sonesta Hotel Reservations:	(800)-SONESTA
Darnise Johnson (General Info)	(301) 596-0100		(504)-586-0300
FAX	(301) 596-6400	Hotel Website	<a href="http://www.sonesta.com/neworleans_royal/">www.sonesta.com/neworleans_royal/</a>
website	<a href="http://www.saviac.org">www.saviac.org</a>		

## Schedule of Events

This program is preliminary and is subject to modification. Check the SAVIAC website at <http://www.saviac.org> for up-to-date program status.

### Tutorials

**Sunday and Monday 7:00 a.m. - 7:00 p.m.**

### Sessions

#### Tuesday Morning

\* \* \* \* \*      \* \*      **Opening Session**      \* \*      \* \* \* \* \*

*Track One  
(Unclassified)*

*Track Two  
(Unclassified)*

*Track Three  
(Unclassified)*

*Track Four  
(Unclassified)*

*Track Five  
(Classified)*

*Track Six  
(Classified)*

#### Tuesday Afternoon

Panel Short Course DG New Engr Forum
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Test Criteria  ARL Session
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Test Facilities  Pyroshock DG
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Training I
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Shock Loading  Finite Element Modeling
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Shock Qualification  Vibration Whipping
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#### Wednesday Morning

Shock Response  SRS Committee
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Blast Effects  Numerical Methods
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SEI/ASCE Standards Meeting
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Training II
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DD(X) UNDEX
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DTRA NWE Technologies
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#### Wednesday Afternoon

HP Data Acq Systems  Perf/Pene
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Vibration Damping  Damping DG
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SEI/ASCE Standards Meeting
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Training III  Tutorial Dev WG
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PVLS
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DTRA NWE Technologies
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#### **Wednesday Night: SAVIAC Community Feedback Social Event**

#### Thursday Morning

Shock Isolation  UNDEX Analysis I
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Vibration Testing  Vibration Modeling
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UNDEX Analysis II  UNDEX Testing
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Training IV
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Structural Response
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Blast  Vul of Civil Infrastructure
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#### Thursday Afternoon:

Alt Ship Shock Test Systems
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Analysis Results
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WG-13
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#### Friday: Tour of Mississippi River Lock

# 76th Shock and Vibration Symposium

## Preliminary Program

### Sunday, October 30

<b>Tutorials</b>	<b>Instructor</b>	<b>Time</b>
Theoretical background and best practice using DDAM	Mr. Tony Abbey	8-11 AM
Beyond the Shock Spectrum Temporal & Frequency Moments, the Product Model, & Uncertainty	Mr. Dave Smallwood	8-11 AM
UNDEX Analysis	Mr. Fred Costanzo, Dr. Ray Daddazio	8-11 AM
Dynamic Pressure Measurements for Munitions, Ordnance, and Other Testing: Part Science and Part Art	Prof Pat Walter	8-11 AM
DDAM Using MSC Software Tools	Mr. Bart McPheeters	12-3 PM
Shock Response Spectrum – Uses & Abuses	Mr. Tim Edwards	12-3 PM
Calibration, Maintenance and Operation of the LWSM & MWSM	Mr. Chris Grunau & Mr. Jeff Morris	12-3 PM
Data Validation and Editing	Mr. Allan Piersol	12-3 PM
Productive DDAM Analysis Using ABAQUS	Dr. David Winkler & Mr. David Woyak	4-7 PM
Basis of Elementary Shock Isolation System Design	Dr. D. Christopher Merrill	4-7 PM
ESS, HALT & Hass	Mr. Wayne Tustin	4-7 PM
Introduction to Vibration Testing	Mr. Jon Wilson	4-7 PM

<b>Tutorials</b>	<b>Instructor</b>	<b>Time</b>
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### Monday, October 31

An Introduction to ABAQUS	Mr. Karl D'Souza	8-11 AM
Review of Structural Dynamics	Prof Josh Gordis	8-11 AM
Naval Shock Analysis & Design	Dr. Rudy Scavuzzo	8-11 AM
Blast Resistant Structural Connections and Detailing	Dr. Ted Krauthammer	8-11 PM
The Measurement and Utilization of Valid Shock and Vibration Data	Dr. Patrick Walter	8-11 AM
Non-Linear FE Analysis for Shock and Vibration	Mr. Tony Abbey	12-3 PM
Shock and Vibration Analysis Using MATLAB	Prof Kjell Ahlin	12-3 PM
Overview of Underwater Shock and DDAM	Dr. Young Shin	12-3 PM
A Primer On Explosion Effects In the Air, Water, and Soil	Dr. Bob Welch	12-3 PM
UNDEX and Acoustic Analysis With ABAQUS	Dr. Jeff Cipolla	4-7 PM
Damping Analysis & Technology	Dr. Jack Henderson, Dr. Peter Torvik & Mr. Ahid Nashif	4-7 PM
Application of the USA Code to Underwater Shock Problems	Dr. John DeRuntz	4-7 PM
Blast Effects and Blast Resistant Design	Prof. Ted Krauthammer	4-7 PM

### Tuesday Morning, November 1

**Chair/Presenter Meeting (All Tuesday Chairs & Presenters Must Attend)**  
**7:00 - 7:30 a.m. Location TBA**

## Opening Session

<b>Call to Order:</b> Mr. Joel Leifer, SAVIAC Program Manager	8:30 am
<b>Welcome:</b> TBD Defense Threat Reduction Agency	8:35 am
<b>Welcome:</b> US Army Engineer Research & Development Center	8:40 am
<b>Welcome:</b> Dr. Jeremy Isenberg, CEO, Weidlinger Associates, Inc.	8:45 am
<b>Welcome:</b> Dr. Reza Sadeghi, MSC.Software	8:50 am
<b>Symposium Highlights:</b> Mr. Joel Leifer, SAVIAC Program Manager	8:55 am
<b>Henry Pusey Award Presentation:</b> Mr. Mike Giltrud, Defense Threat Reduction Agency, Dr. Bob Welch, US Army Engineer Research & Development Center, Dr. Ray Daddazio, Weidlinger Associates, Inc., Mr. Bart Mcpheeters, MSC.Software	9:10 am
<b>Mel Baron Award Presentation:</b> TBD	9:20 am
<b>SAVIAC Supporters Recognition</b> - Mr. Joel Leifer, SAVIAC Program Manager	9:40 am
<b>Director's Remarks:</b> Dr. Charles Robert Welch, USAE Research and Development Center	9:50 am
<b>Break</b>	10:00 am
<b>Keynote Address:</b> Dr. James Houston, Director, USAE Research and Development Center	10:15 am
<b>Elias Klein Memorial Lecture: "Columbia"</b> - Mr. Edwin Fasanella, NASA Langley Research Center	11:00 am
<b>Break</b>	11:30 am

## Exhibitors Luncheon

**Tour the exhibits as you enjoy lunch in the exhibit area from 11:45 - 1:00**

### Tuesday Afternoon, November 1

#### Track One

<b>Hiring, Training, and Mentoring of the Next Generation of Technical Professionals</b>	<b>Chair: Mr. Michael Riley, NAVSEA</b>
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*The technical professionals represented by this community play a vital role in fielding equipment for use by the warfighter so it is essential that this expertise is passed on. Come join Mrs Mary Lacey (NPSP), Dr. Robert Sierakowski (USAF), Dr. James Houston (US Army), Dr. Jeremy Isenberg (Weidlinger Associates, Inc.), Prof Sam Kiger (University of Missouri), and Mr. Ray Williams (Electric Boat Corp.) for their thoughts and be prepared to offer your ideas on how this can be accomplished.*

<b>Short Course Development Discussion Group</b>	<b>Leader: Mr. Richard Peppin, Scantek, Inc.</b>
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*SAVIAC is interested in developing a series of courses to offer to the community. We're looking for ideas for short courses, distance learning, home-study, and web based offerings of various lengths in subjects that would be of interest to the community. If you would like to be an instructor or are interested in taking a course, come to present your ideas.*

<b>New Engineer's Forum</b>	<b>Chair: Ms Margaret Tang, Weidlinger Associates, Inc.</b>
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*The forum, to be chaired by Margaret Tang of Weidlinger Associates, will provide an opportunity for younger engineers to network with their peers and develop the skills needed to move into leadership positions in the community. Mrs. Mary Lacey, PEO National Security Personnel System and Keynote Speaker at the 75th Shock & Vibration Symposium has agreed to address the forum. Others on the program include Prof Ted Krauthammer, Protective Technology Center, Penn State University who will describe how a building is assembled and a representative from General Dynamics Electric Boat who will show a video on how a submarine is constructed. There will also be a presentation on the SAVIAC sponsored Mentor Program and a discussion with the participants on the future direction of the Forum.*

**Track Two****Test Criteria****Chair:**

- Derivation of MALD Ground Test Vibration Requirements from Captive Carriage Flight Tests** ~ *Pat Willems Raytheon Missile Systems, Scott Fling, JE Sverdrup*
- Development of Rail Impact Test Criteria for Cushioned Draft Gear Rail Cars** ~ *Stanley Poynor, Wayne Clay, Jeff Kirk, Lockheed Martin Missiles & Fire Control*
- On the Use of Linear Accelerometers in Six-DOF Laboratory Motion Replication: A Unified Time-Domain Analysis** ~ *Dr. Norman Fitz-Coy University of Florida, Dr. Michael Hale, Redstone Technical Test Center*
- Utilization of Vehicle Test Course Speed Distributions to Refine Methods of Vehicle Scenario Derivation for Laboratory Vibration Test Schedule (LVTS) Development** ~ *Jesse Porter, US Army Redstone Technical Test Center, Michael Barry, US Army Aberdeen Test Center*
- Methodology for Determining Ballistic Shock Damage to Internal Components Mounted within Combat Vehicles** ~ *Jennifer Akers, Michael Gillich, Ed Fioravante, U.S. Army Research Laboratory*
- Earthquake Hazard Analysis and Dynamic Site Response Evaluation for Design of Tower Buildings in Dubai, UAE** ~ *Prof Azm Al-Homoud, American University of Sharjah*

**Hardening of Electronics & Structures to High-g Effects Induced by Gun Launch and Ballistic Shock****Chair: Mr. Ami Frydman, ARL**

- Finite Element Modeling of Electronic Components in Projectile** ~ *Dr. Mohamed Trabia, Dr. Brendan O'Toole, Dr. Samaan Ladkany, Dr. Mostafiz Chowdhury, University of Nevada, Las Vegas*
- Optimization of Joint Design for Side Panel of a Military Vehicle for Shock Reduction** ~ *Dr. Mohamed Trabia, Dr. Brendan O'Toole, Dr. Samaan Ladkany, Dr. Jinhua Huang, University of Nevada, Las Vegas*
- Protection of Military Vehicle Occupants from Mine Blast Using an Air Bladder Seat Shock Isolation System** ~ *Dr. Douglas Reynolds, Dr. Brian Landsberger, Chris Ransel and Tarek Deeb, University of Nevada Las Vegas*
- Simulation and Measurement of Shock Transmission Across Joints** ~ *Dr. Brendan O'Toole, Dr. Samaan Ladkany, Masoud Fegghi, Karthik Doppola, University of Nevada Las Vegas*

**Track Three****Test Facilities****Chair: Ed Dyer, United Defense, LP**

- US Army Centrifuge: Critical Capability for the Future** ~ *Wipaji Vanadit-Ellis, US Army Engineering Research and Development Center*
- Magneto-Inductive Remote Activation Munitions System** ~ *Dr. Jon Windham, Dr. James Cargile, US Army Engineer Research & Development Center, Richard Andrejkovics, Picatinny Arsenal, Paul Wrathal, Magneto-Inductive Systems Ltd*
- Development of a Test System to Replicate the Shock Profiles Through Small Arms Accessories** ~ *Nigel Linden Re Test Equipment, Inc.*
- Design and Evaluation of Multi-Axis High-Frequency Vibration Shaker Systems** ~ *Dr. Georg Mauer, Brinda Venkatesh, University of Nevada, Las Vegas*
- Structural Damage Detection and Localization by Non-linear Acoustic Spectroscopy** ~ *Dr. Gerard Vanderborck, Thales Underwater Systems, Dr. Bernard Rousselet, Nice University*
- Design of a Shock Test Machine for Encanistered Missiles** ~ *Dr. Jon Yagla, Naval Surface Warfare Center Dahlgren Division*
- Calibration and Qualification of the WOX-MSTM Encanistered Missile Shock Test Machine** ~ *Dr. Jon Yagla, Naval Surface Warfare Center Dahlgren Division*
- Simultaneous Multi-Axis Mechanical Shock Simulations** ~ *Dr. Vesta Bateman, Lawrence Carlson, Sandia National Laboratories*
- Constitutive Model Evaluation for EOD Ballistic Impact Simulations** ~ *Dr. Mark Vulitsky, Naval Explosive Ordnance Disposal Technology Division, Dr. Leonard Schwer, Schwer Engineering & Consulting Services, Kenneth Poe, Dr. Kurt Hacker, Naval Explosive Ordnance Disposal Technology Division*

**Pyroshock Discussion Group****Leader: Dr. Vesta Bateman, Sandia National Laboratory**

The group will discuss current pyroshock testing issues as volunteered by group members. Current success stories are welcome as well as problems with pyroshock testing, instrumentation, and data analysis.

**Track Four****Training I****Chair:**

**Basics of Acoustics: Generation, Description, Instrumentation, & Measurement** ~ *Richard Peppin, Scantek, Inc.*  
**Using The Pseudo Velocity Shock Spectrum For Shock Damage Potential, Part 1** ~ *Dr. Howard Gaberson Consultant*  
**Using The Pseudo Velocity Shock Spectrum For Shock Damage Potential Part 2** ~ *Dr. Howard Gaberson, Consultant*

**Track Five (CLASSIFIED)****Shock Loading****Chair: Dawn Barasso, Electric Boat**

**An Electromagnetic Transducer for Generating High Pressure, Underwater Pulses** ~ *Dr. Michael Raleigh, Dr. James Galambos, BAE Systems Advanced Technologies, Inc.*  
**Evaluation of Injury Criteria for High Speed Planing Craft** ~ *Dr. Cameron Bass University of Virginia, Dr. Ron Peterson, Naval Surface Warfare Center - Panama City, Adam Ziemba, Dr. Robert Salzar, University of Virginia*  
**Injury Specification Strategy for Occupants in High-Speed Planning Craft** ~ *Dr. Cameron Bass University of Virginia, Dr. Ron Peterson, Naval Surface Warfare Center - Panama City, Adam Ziemba, Dr. Robert Salzar, University of Virginia*  
**Encanistered Missile Perspective of WOX Calibration Test Results** ~ *Kenneth Lussky BAE Systems Land & Armaments*  
**Determination of Deck Frequencies to Support Shock Isolator Design** ~ *Jerry Dwyer, Northrop Grumman Newport News*

**Finite Element Modeling****Chair: Ed Alexander, United Defense, LP**

**Finite Element Modeling of Close Encounters With Underwater Explosions** ~ *Dr. Gale Mulligan, Electric Boat Corporation*  
**A Comparison of LS-DYNA Composite Failure Models In a Dynamic Environment** ~ *Bill Gregory, Christopher Key, Dr. Jim Lua and Dr. Richard Cobb, Anteon Corp*  
**Dynamic Response And Failure Prediction Of Composite Hat Stiffeners** ~ *Bill Gregory, Dr. Richard Cobb, Dr. Jim Lua, Joshua Gorfain, Anteon Corp*  
**Finite Element Analysis in Support of MIL-S-901D Shock Testing of the AN/SPQ-9B Antenna Group** ~ *Andrew Lotz Northrop Grumman Newport News*  
**Underwater Explosion Finite Element Analyses using ABAQUS Explicit in Support of the Low Cost Conformal Array Shock Qualification Effort** ~ *Brett Lussier, Naval Undersea Warfare Center Division Newport*

**Track Six (CLASSIFIED)****Shock Qualification****Chair: Dr. Dale Bloodgood, NSWCCD**  
**Co-Chair:**

**Shipboard Shock Qualification of the MK54 Torpedo** ~ *Frank McNeilly Naval Undersea Warfare Center Division Newport*  
**Main Propulsion Unit and Ship Service Turbine Generator Qualification Shock Analyses** ~ *Jonathan Webster, Lee Miller, Electric Boat Corporation*  
**Shock Test Program and Results of the VIRGINIA (774) Class Weapon Stowage and Handling System (WSHS)** ~ *Roland Traylor, Jr., Electric Boat Corporation*  
**Qualification of the WOX- Missile Shock Test Machine (WOX-MSTM) For Testing Standard Missile 3 in a MK21 Canister** ~ *Dr. Jon Yagla Naval Surface Warfare Center*

**Vibration****Chair:**  
**Co-Chair:**

**Comparing the Measured Response of an AN/ALQ-99 Tactical Jamming System Pod to the Input Motions During a Vibration Study** ~ *James Wilcoski, Jonathon Trovillion, US Army Engineer Research and Development Center, Construction Engineering*  
**Validation of FEM Predictions of Vibration Levels to support CVN Design** ~ *Kevin Arden Northrop Grumman Newport News*  
**Use of Vibration Measurements and FEM Predictions to Evaluate Location of Island Structure for New CVN Design** ~ *Davis Hill, Jason Hartmann, Northrop Grumman Newport News*  
**Vibration Measurements Performed on Carrier Sea Trials to Support CVN Design** ~ *James Gardner, Northrop Grumman Newport News*

**Track Six (CLASSIFIED) Continued****Whipping****Chair: Dr. David Russell, Electric Boat**

**Whipping Analyses of the DDG-51 Class Full Ship Model** ~ LCDR Gerald Prendergast, US Navy, Dr. Young Shin, Naval Postgraduate School

**Effect On Low-Frequency Whipping Response Due To Insertion Of Multi-Mission Module Into the VIRGINIA Class Submarines** ~ Dawn Barrasso, Electric Boat Corporation

**Evaluating Ship Structure Subjected to Whipping, Due to UNDEX, During the Design Process** ~ Nicole Dudley, Northrop Grumman Newport News, Natale Nappi, N.S. Nappi Associates, Inc.

**Wednesday Morning, November 2****Chair/Presenter Meeting (All Wednesday Chairs & Presenters Must Attend)****7:00 - 7:30 a.m. Location TBA****Track One****Shock Response****Chair: Mr. Steve Lofton, ERDC**

**Derivation of the Ramp Invariant Filter for Shock Response Spectrum Calculations** ~ David Smallwood, Consultant  
**Applying Fuzzy Structure Theory to Shock Response Predictions** ~ Carina Ting, , Thomas Littlewood, Dr. Russel Miller and Jeffrey O'Brien, Anteon Corporation

**A Technique for the Identification of the Optimum Inputs for a Vibration or Acoustic Test** ~ Jerome Cap, Melissa C de Baca, Sandia National Laboratories, David Smallwood, Compa Industries

**On the Comparison of Test Specification and Measured Field Data** ~ Prof Kjell Ahlin, Blekinge Institute of Technology  
**Modal Expressions for Relative Displacements Underlying Pseudovelocity Shock-Response Spectra, for Idealized Remote Shock Loadings: Derivation and Verification** ~ Dr. R. David Hampton, US Military Academy

**Analytical Kinematic Expressions for Pseudovelocity Shock Response Spectra of Generally Damped Linear Systems** ~ Dr. R. David Hampton, US Military Academy

**Shock Response Spectrum Committee****Chair: Mr. Tim Edwards, NSWCCD**

*The Technical Committee on the Shock Response Spectrum was recently organized to serve the SAVIAC community as a central point of contact for shock representation issues. The committee's duties include: organizing symposium discussion groups and dedicated paper sessions, acting as a forum for introducing new and related procedures for shock representation, producing best practices guidelines for validation & implementation of SRS algorithms, interfacing with standards organizations (ISO, IEC & others) on standards for calculation of a SRS, assembling landmark papers on SRS and related procedures and producing a compilation or compendium, and acting as a repository for representative digitized data sets (naval shock, El Centro earthquake, pyro-shock, classical, etc.). Join us as we discuss SRS committee business such as shaping the committee's interfacing role with standards organizations and beginning the assembly of important works for a compendium on shock representation.*

**Track Two****Blast Effects****Chair: Mr. Denis Rickman, ERDC**

**An Experimental Approach to Determine Load-functions for the Impact of Fluid Filled Projectiles** ~ Dr Nico Hermann, Klaus Kreuker, Prof. Lothar Stempniewski, University of Karlsruhe

**Perforation of Metal Plates: Laboratory Experiments and Numerical Simulations** ~ Dr. Leonard Schwer, Schwer Engineering and Consulting Services, Dr. Kurt Hacker, Dr. Kenneth Poe, Naval Explosive Ordnance Disposal Technology Division

**Numerical Simulations Of Inverse Planar Impact Tests On Sand** ~ Leo Laine ANKER-ZWMER Engineering AS

**Track Two Continued**

- Numerical Investigation on the Impact Strength of back Plates of Weldox Steel, Pure Copper, 2024-T3 Aluminum Alloy, Ti-6Al-4V Titanium Alloy and Some Composites** ~ Rengas Venkataraman, Dr. Abdalla Elbella, Potluri Krishna, Bradley University
- The Characteristics of Blade Formation/Cutting Process of Linear Shaped Charges (LSCs)** ~ Seokbin Lim, Braden Lusk, Dr. Paul Worsley, Rock Mechanics & Explosives Research Center
- Projectile Deceleration for Perforation through Layers of Un-reinforced Concrete Targets** ~ Jeff Averett, Dr. Donald Cargile, US Army Engineer Research and Development Center, John Foster, Dr. Vincent Luk, Sandia National Laboratories

**Numerical Methods**

**Chair: Dr. Albert Bush, ERDC**  
**Co-Chair: Dr. Paul Franklin, BIW**

- Extension of Infinite Elements and Absorbing Boundary Conditions to Eigenanalysis of Sub-merged Structures** ~ Dr. Jeff Cipolla, ABAQUS, Inc.
- Cross Orthogonality Check-out of Superelements** ~ Frederick Russell, Electric Boat Corporation
- Understanding and Using the Spectral Density Matrix** ~ Dr. Marcos Underwood, Tony Keller, Spectral Dynamics, Inc.
- A Comprehensive Approach for Treating Closely Spaced Modes in the Dynamic Design Analysis Method** ~ Dr. David Winkler, David Woyak, ABAQUS Inc.

**Track Three****SEI/ASCE Blast Protection of Buildings Standard Committee Meeting**

**Chair: Mr. Don Dusenberry,**  
**Simpson, Gumpertz & Heger, Inc.**

The Structural Engineering Institute of the American Society of Civil Engineers is preparing a new Standard for the design of buildings for blast effects. At the Committee's semi-annual meeting at the SAVIAC Symposium, Task Committees will present the first drafts of the mandatory and commentary chapters for the Standard, for discussion and comment.

**Track Four****Training II****Chair:**

- Tutorial on Ballistic Shock in Armored Vehicles** ~ Scott Walton US Army Aberdeen Test Center
- Metal Fatigue I** ~ Dr. Rudy Scavuzzo, University of Akron
- Metal Fatigue II** ~ Dr. Rudy Scavuzzo, University of Akron

**Education Committee****Chair: Mr. Andy Anderson, Unted Defense LP**

The Tutorial Development Working Group will meet to discuss the tutorial program leading to a comprehensive Certificate for those who complete the entire program. This program will share the tutorial program of the Institute of Environmental Sciences and Technology (IEST) to quickly allow participants to acquire their Certificate. Inputs for education topics of interest, potential tutorial presenters, and other ideas to improve and foster this program are urgently requested. Come join us and provide your input!

**Track Five (CLASSIFIED)****DD(X) UNDEX**

**Chair: Mr. Sean Murphy, NGSS**  
**Co-Chair: Mr. Joel Myers, NGSS**

- DD(X) Machinery and Electronics Shock Mitigated Rafting: Design Concepts** ~ Dr. Russ Miller, Vince Godino, Skip Dixon, Jeff O'Brien, Anteon Corp.
- Modeling, Simulation and Validation of GOLDWHIP for DD(X)** ~ Sean Murphy, Northrop Grumman Ship Systems
- DD(X) UNDEX Hull Whipping Test: A Modeling and Simulation Comparison of Large Charge and Small Charge Shock Trial Scenarios** ~ Derek Skahen, Joel Myers, Steve Rutgerson, Northrop Grumman Ship Systems
- DD(X) UNDEX Hull Whipping Test: An evaluation of M&S Tools for above design level analyses** ~ Sean Murphy, Dr. Erwin Moyer, Northrop Grumman Ship Systems

**Track Five (CLASSIFIED) Continued**

- Tutorial- PPD 802-7651312 Shock (High-Impact and Low-Impact) Testing, DD(X) Shipboard Machinery, Equipment and Systems, Requirements for** ~ *D. Shawn McPartland, Anteon Corp.*
- DD(X) Machinery and Electronics Shock Mitigation Rafting: Equipment Testing and Modeling** ~ *Jeff O'Brien, Brendan Woolrich, Vince Godino, Dr. Russ Miller, Anteon Corporation*
- DD(X) Machinery and Electronics Shock Mitigation Rafting: Device Algorithm Development** ~ *Jeff O'Brien, Brendan Woolrich, Vince Godino, Dr. Russ Miller, Anteon Corporation*
- DD(X) Machinery and Electronics Shock Mitigated Rafting: Modeling, Simulation and Validation** ~ *Dr. Russ Miller, Jeff O'Brien, Brenden Woolrich, Jeff Gorfain, Anteon Corp*
- DD(X) Machinery and Electronics Shock Mitigated Rafting: Test Articles** ~ *William Dickson, Vince Godino, Russ Miller, Jeff O'Brien, Anteon Corporation*
- DD(X) Whole Ship Transient Analysis** ~ *Tom Littlewood, Morgan Eash, Chris Key, Christian Whitney, Anteon Corporation*

**Track Six (CLASSIFIED)****Special Sessions on DTRA Nuclear Weapons Effects Technologies: Non-ideal Airblast Loading****Chair: Mr. Mike Giltrud, DTRA**

- DTRA Software Tools for Target Damage Assessment** ~ *Michael Giltrud, Defense Threat Reduction Agency*
- NIAB Overview** ~ *Ken Kreyenhagen, NGIT*
- Airblast Environment Modeling Laboratory Scale Experiments** ~ *Paul Yarrington, Sandia National Laboratory*
- Loading On Closely Spaced Structures** ~ *Dr. Michael Kerry, Dr. Keith Seal, A.W.E.*
- Response of Closely Spaced Multiple Objects When Subject to Blast Loading** ~ *Dr. Keith Seal, Dr. Mike Kerry, A.W.E.*
- Non Ideal Airblast Effects from Urban and Natural Terrain** ~ *Joe Crepeau, Charles Needham, ARA*
- Urban Airblast Calculations** ~ *Jack Klump, SAIC*
- Airblast from Underground Explosions** ~ *Philip Hookham, Titan Research*
- Targeting Considerations (VNTK Overview)** ~ *Charles Deel SAIC*

**Wednesday Afternoon, November 2****Track One****High Performance Data Acquisition Systems****Chair: Mr. Scott Walton, ARL**

- High Speed Ballistic Digitizer System** ~ *Dr. Lee Francis, Gary Uhland, Dustin Houseman, Corey Himes, US Army Aberdeen Test Center*
- Electro-Magnetic Interference (EMI) in Instrumentation Cables During Explosive Testing** ~ *Scott Walton US Army Aberdeen Test Center*
- The Accelerometer Cable - It Can't Get No Respect** ~ *Prof Patrick Walter, Texas Christian University*
- New Approaches to High Performance Data Acquisition** ~ *Gary Schneider, Hi-Techniques*
- LD Tests: A method for Long Distance Communication to Smart Transducers with TEDS** ~ *Douglas Firth, Stephen Finney, Precision Filters, Inc.*

**Perforation/Penetration****Chair: Dr. Don Cargile, ERDC****Co-Chair:**

- Protecting Humans From Blast Induced Shock Waves** ~ *Dr. Ken-An Lou, ArmorWorks, Inc., Richard Zimmerman, Zerad, Inc.*
- Numerical Modeling Approaches for Simulation of Landmine Blast Loading** ~ *Laura Donahue, Martec, Ltd., Dr. Amal Bouamoul, Defense R&D Canada - Valcartier, Tim Dunbar, Martec, Ltd.*
- Dynamic Analysis of Concrete Structure Under Blast Load Using Plastic Damage Model** ~ *Jim Won Nam, Ho Jin Kim, Yonsei University, Dr. Hyung Jin Choi, Karagozian & Case Inc., Ha-Won Song, Yonsei University*
- Cumulative Error Due to Integration Procedure in Progressive Collapse Analysis** ~ *Dr. Hyung-Jin Choi, Karagozian & Case*
- Consideration on Bridge Blast Analysis and its Damage Evaluation** ~ *Dr. Hyung-Jin Choi, Karagozian & Case Inc.*
- Numerical Method for Evaluating Debris Size and Velocity of Slab** ~ *Dr. Hyung-Jin Choi, John Crawford, Karagozian & Case Inc.*

**Track Two****Vibration Damping****Chair: Dr. John Henderson, UTC**

**Rim Dampers for System Modes of a Turbine Engine Integrally Bladed Rotor** ~ Dr. John Henderson, Phillip Johnson, Universal Technology Corp.

**Durability Studies of the Resistance of Viscoelastic Materials to High Temperatures** ~ Ahid Nashif, Consultant

**Broadband Damping in High Temperature Environments Using Multiple Tuned Mass Absorbers** ~ Dr. Jeffery Zapfe, Acentech Incorporated

**Sources of Error in Obtaining Damping Properties of Hard Coatings from Vibration Tests** ~ Dr. Peter Torvik, Consultant

**Web Based Viscoelastic Material Properties Database Discussion Group****Chair: Mr. Ahid Nashif, Consultant**

This discussion will center of the status of the effort to build a viscoelastic materials properties database that can be accessed on the internet.

**Track Three****SEI/ASCE Blast Protection of Buildings Standard Committee Meeting****Chair: Mr. Don Dusenberry, Simpson, Gumpertz & Heger, Inc.**

The Structural Engineering Institute of the American Society of Civil Engineers is preparing a new Standard for the design of buildings for blast effects. At the Committee's semi-annual meeting at the SAVIAC Symposium, Task Committees will present the first drafts of the mandatory and commentary chapters for the Standard, for discussion and comment.

**Track Four****Training****Chair:**

**Practical Random Vibration Analysis of Nonlinear Structures via Finite Element Models** ~ Dr. Thomas Paez, Sandia National Laboratories

**Pyroshock Testing** ~ Dr. Vesta Bateman, Sandia National Laboratories

**FEA, Sparse Data, and Aliasing** ~ Edward Dyer, United Defense, L.P.

**Track Five (CLASSIFIED)****The Peripheral Vertical Launcher System (PVLS) Engineering Development Model (EDM) for the DDX Design Methodology****Co-Chair: Dr. Tom Moyer, NGSS  
Co-Chair: Mr. Bob Wunderlik, NSWCCD,**

**The PVLS EDM & DD(X) Design Methodology** ~ Dr. E. Thomas Moyer, Northrop Grumman Ship Systems, Robert Wunderlick, Naval Surface Warfare Center Carderock Division, Robert DeGraeve, Northrop Grumman Ship Systems

**Contribution to Blast of Solid Propellant Under Shock Loading - Experiments and Models** ~ Dr. Michael Kaneshige, Dr. David Crawford, Daniel Sandoval, Dr. Robert Pahl, Sandia National Laboratory

**PVLS Design Load Methodology** ~ Dr. Christopher Freitas, Southwest Research Institute, Dr. David Crawford, Sandia National Laboratory, Ryan Keedy, Trueman Sharron, Southwest Research Institute

**PVLS Structural Analysis** ~ Christopher Joseph, Robert DeGraeve, H.W. Ruth, Northrop Grumman Ship Systems

**Planning, Management, and Conduct of DD(X) PVLS EDM Full-Scale Developmental Tests Events** ~ G.D. (Jerry) Hill, Glen Snyder, Alion Science and Technology/JJMA Maritime Sector

**PVLS Design Evolution & Lessons Learned** ~ Dr. E. Thomas Moyer, Christopher Joseph, Robert DeGraeve, Northrop Grumman Ship Systems

**Fragmentation Protection and Warhead Resistance Experiments** ~ Dr. E. Thomas Moyer Northrop Grumman Ship Systems, Dr. Charles Anderson, Southwest Research Institute, G.D. (Jerry) Hill, Alion Science and Technology/JJMA Maritime Sector, Dr. Christopher Freitas, Southwest Research Institute

**Maximum Credible Detonation Event; MCDE(2) Final Design & Performance** ~ Dr. E. Thomas Moyer, H W Ruth, Christopher Joseph, Northrop Grumman Ship Systems

**Track Five (CLASSIFIED) Continued**

- A Coupled Analysis Approach to Threat Modeling** ~ Jim Uschock, Naval Surface Warfare Center Dahlgren Division, Dr. Christopher Freitas, Ryan Keedy, Southwest Research Institute
- PVLS Ballistic Screen Design** ~ Rod Waller, Alion Science and Technology/JJMA Maritime Sector, Ernest Faccini, Raytheon Systems Corporation, Chris Hoppel US Army Research Laboratory
- PVLS Risk Retirement** ~ Robert Wunderlik, Naval Surface Warfare Center Carderock Division, Dr. E. Thomas Moyer, Northrop Grumman Ship Systems

**Track Six (CLASSIFIED)**

**Special Sessions on DTRA Nuclear Weapons Effects Technologies: Vulnerability of Underground Facilities**

**Chair: MAJ Jim Chrisley, DTRA**

- DTRA IGVN Program Overview** ~ Maj Jim Chrisley, Defense Threat Reduction Agency
- Target Planning: Ground Vulnerability Number** ~ Charles Deel, SAIC
- Ground Shock Model, WinGS** ~ Russ England, TRT
- Structural Response: Local Damage Mode** ~ Scott Blouin, ARA
- Structural Response Global Damage Mode: Finite Element Modeling** ~ Dr. Howard Levine Weidlinger Associates, Inc.
- Structural Response Global Damage Mode: Experimental Calibration** ~ Dan Burgess, NGIT
- Structural Response Global Damage Mode: Engineering Model** ~ Regan Burmeister, Applied Research Associates
- Field Experiment Comparisons** ~ Maj Scott Grammer, Defense Threat Reduction Agency

**Wednesday Evening, November 2**

**SAVIAC Community Feedback  
Town Hall Meeting**

*This is your opportunity to provide feedback to the SAVIAC leadership on items of importance to you. Whether you have an idea of a new product or service SAVIAC should provide, or just want to comment on the Symposium programming, you will find a platform here. Join us prior to the Social event for an hour of spirited discussion.*

**Social Event - All are invited**

**Thursday Morning, November 3**

**Chair/Presenter Meeting (All Thursday Chairs & Presenters Must Attend)  
7:00 - 7:30 a.m. Location TBA**

**Track One****Shock Isolation**

**Chair: Brian Detwiler, BIW**

- A Comparison of Elastomeric Isolators for Cabinet Isolation on Naval Vessels** ~ Dr Robert Monson, Dr. Jack Yan, Julia Neuman, Lockheed Martin
- An Evaluation of Machinery Raft Isolation Performance for Naval Applications** ~ Dr. Matthew Conti, Bradley Ross, Kyle Martini, David Warwick, Anteon Corporation
- Dynamic Properties and Modeling of Wire Rope Isolator** ~ Dr. Jarkko Keinanen, Dr. Kalle Vehvilainen, VIT, Technical Research Center of Finland
- A Method for Predicting the Responses of Nonlinear Shock Isolated System** ~ Dr. Liu Jian-Hu, China Ship Scientific Research Centre

**Track One Continued****UNDEX Analysis I****Chair: Mr. Adam Hapij, Weidlinger Associates****Co-Chair:**

- Application of Non-linear Contact Surfaces in Modeling Whole Ship Shock Analysis** ~ Tony Abbey, Noran Engineering
- Modeling of Unsteady Cavitation Induced by UNDEX** ~ Dr. Kin Chew Hung, Institute of High Performance Computing, Dr. Boo Cheong Khoo, National University of Singapore, Wenfeng Xie, Dr. Tiegang Liu
- Dynamic Simulation of a Mine Barge Subjected to Underwater Explosions (UNDEX)** ~ Dr. Juha Virtanen, Dr. Markku Jutunen, VTT Technical Research Center of Finland
- Littoral UNDEX Development Program of the Finnish Navy** ~ LT. Turkka Jappinen, Finnish Navy, Dr. Markku Juntenen, VTT Technical Research Center of Finland
- Fluid-Structure Interaction Effects Resulting From Hull Appendage Coupling** ~ LT. Mehmet Avcu, Turkish Navy, Jarema Didoszak, Dr. Young Shin, Naval Postgraduate School
- Further Investigation into the Technique and Applicability of DDAM Analysis in Large Models** ~ Tony Abbey, Noran Engineering

**Track Two****Vibration Testing****Chair: Mr. Gary Zook, NUWC****Co-Chair: Mr. Vince Chiarito, ERDC**

- Hull Radiation Efficiency: Transition from Local to Global Behavior** ~ Bart Burkewitz, Kyle Martini, and Dr. Matthew Conti, Anteon Corporation
- Analysis of the Effect of Hydrodynamic Preloading on the Acoustic Radiation of a Sonar Array** ~ Karl D'Souza Subham Sett, Dr. Jeffrey Cipolla, ABAQUS, Inc.
- Flutter and Vibration of Bearingless Elastic Helicopter Rotor Blades Featuring Flapping and Feathering Coupling** ~ Prof Metin, Orhan Kaya, Ozge Ozdemir, Istanbul Technical University
- Development of a Seismo-Tectonic Model for the United Arab Emirates** ~ Dr. Azm Al-Homoud, American University of Sharjah

**Vibration Modeling****Chair: Mr.**

- New Developments in Shipboard Vibration** ~ Chuck Vallance, Raytheon
- Structural Response Limit Specifications for Product Models** ~ Dr. Ronald Merritt, Naval Air Warfare Center
- Estimating Displacement From Accelerometer Data** ~ Edward Brennan, Dr. Carl Jannetti, Jeff Giesecke, Dr. Dana Day, Lockheed Martin
- Random Excitation of the Van der Pol Oscillator** ~ Dr. Hans Gruenberger, Consultant
- Densification Using Deep Vibro Compaction of Highly Compressible Reclaimed Beach Sand Characterized by High Percentage of Shell and Carbonates** ~ Prof Azm Al-Homoud, American University of Sharjah
- Free Vibration Analysis of a Rotating Double Tapered Timoshenko Beam by Dtm** ~ Ozge Demiriozg, Prof Metin Orhan Kaya, Istanbul Technical University

**Track Three****UNDEX Analysis II****Chair: Gorge Camp, BIW**

- VR Based Visualization System for UNDEX Ship Shock Simulation by Using Digital Mock-up Technology** ~ Changmin Lee, Dr. Jung-Hoon Chung, Jaemun Yun, Dr. Hanjin Lee, Korea Research Institute of Ships & Ocean Engineering
- Application of Design of Experiment Methodology to the UNDEX Whole Ship Shock Modeling & Simulation** ~ Dr Jung-Hoon Chung, Korea Institute of Machinery and Materials, Jeong-Il Kwon, Dr. Sang-Gab Lee, Korea Maritime University
- Design of An Integrated Framework for Efficient UNDEX Ship Shock Modeling & Simulation** ~ Dr. Dae-Seung Cho, Pusan National University, Dr. Jung Hoon Chung, Korea Institute of Machinery and Materials, Dr. Tae-Muk Choi, Jin-Hyeong Kim, Createch
- Biodynamic Response Analysis of a Human on Floating Shock Platform to UNDEX** ~ Prof Sang-Gab Lee, Jeong-Il Kwon, Korea Maritime University, Dr. Jung-Hoon Chung, Korea Institute of Machinery and Materials
- Estimation Method for Longitudinal Bending Strength of a Damaged Ship due to a Close-in UNDEX Bubble** ~ Dr. Akihiro Yasuda, Akihiko Imakita, Mitsui Engineering & Shipbuilding Co, Ltd.
- DD(X) Advanced Gun System Barrel/Projectile ABAQUS Dynamic Model Analysis & Validation** ~ Ed Alexander, Dr. Brian

## UNDEX Testing

Chair:

- Shock Tested COTS laptop Enclosure** ~ Jefferey Giesecke, James Gentry and Edward Brennan, Lockheed Martin  
**Mechanical Shock Failure of Electronic Equipment** ~ Leland Smith, Thomas Savell, GCAS, Inc.  
**Nearby UNDEX Tests On a Thick Plate** ~ Johannes E. Van Aanhold, TNO Built Environment and Geosciences, Theo N. Bosman, Royal Netherlands Navy  
**Nearby UNDEX Tests on Thin Panels** ~ Johannes E. Van Aanhold, TNO Built Environment and Geosciences, Theo N. Bosman, Royal Netherlands Navy  
*Experimental verification of relationship between bubble motion and shock vibration of ship equipment* ~ Prof. Li Guo-Hua, China Ship Scientific Research Centre

## Track Four

### Training IV

Chair:

TBD

## Track Five (CLASSIFIED)

### Structural Response

Chair: Dr. Paul Mlakar, ERDC  
Co-Chair: Mr. Jeff Averett, ERDC

- Arena Fragment Experiments Using Mortars** ~ Lebron Simmons, US Army Engineer Research & Development Center  
**Experiments to Investigate Behind-Wall Effects Due to Explosive Breaching of Reinforced Concrete Walls** ~ Denis Rickman, Jay Ehrgott, US Army Engineer Research & Development Center  
**Development of an Improved Model for Predicting First-Crack of Laminated Glass Subjected to Airblast** ~ Steven Lofton, US Army Engineer Research & Development Center, Clayton Hooker, Sentel, Inc.  
**Pressure-Impulse Curves for Airblast Loaded Flat Slabs** ~ Dr. Kent Goering, Michael Miraglia, Applied Research Associates, Inc.  
**Using Coupled Numerical Simulations to Study Blast Focusing** ~ Dr. James O'Daniel, James Ray, US Army Engineer Research & Development Center  
**Ground Shock Loading on Concrete Slabs with Varying Edge Fixity** ~ Jay Ehrgott, Dr. Donald Cargile, Jon Windham, US Army Engineer Research & Development Center  
**Oblique Perforation Experiments of Urban Wall Materials in Urban Operations by Indirect Fire Munitions** ~ Rayment Moxley, Dr. Donald Cargile, US Army Engineer Research & Development Center, Richard Summers, Robert Phillabaum II, US Army Research Laboratory  
**Numerical Simulation of Projectile Penetration Into Thick and Thin Slabs of SAM-35 Concrete** ~ Erin Williams, Dr. Stephen Akers, Rayment Moxley, Paul Reed, US Army Engineer Research & Development Center

## Track Six (CLASSIFIED)

### Blast

Chair: Dr. James Baylot, ERDC  
Co-Chair: Mr. Lebron Simmons, ERDC

- Theoretical and Empirical Analysis of the Behavior of Electromagnetic Emissions from Cased Explosives** ~ Mark Schmidt, Dr. William Brown, Tim Samaras, and William Broad, Applied Research Associates  
**Partial-City Air-blast Experiments and Comparison with Numerical Predictions** ~ Dr. James Baylot, Byron Armstrong, Dennis Rickman, US Army Engineer Research & Development Center  
**Blast Load Predictions for Building Groups and Comparison with Test Data** ~ Dr. Jihui Geng, Dr. Kelly Thomas, Baker Engineering and Risk Consultants, Inc., Dale Nebuda, US Army Corps of Engineers Protective Design Center  
**A Study of the Effects of Casing Material Properties on the Airblast From Cased Explosive Charges** ~ Dr. Alan Ohrt, Air Force Research Laboratory, Dr. Seung Lee, Defense Threat Reduction Agency  
**Structural Optimization of Non-Line-of-Sight Cannon (NLOS-C) Turret** ~ Dr. Nam Ngo, Vincent Whelan, Dr. Brian Bauman, Ed Alexander, United Defense, L.P.

**Track Six (CLASSIFIED) Continued****Vulnerability of Civil Infrastructure to Terrorist Threats****Chair: Dr. Will McMahon, ERDC**  
**Co-Chair: Ms Yazmin Seda Sanabria, ERDC**

- Numerical Simulations of Navigation Lock (Lift) Gates Subject to Blast Loading** ~ Dr. James O'Daniel, Enrique E. Matheu, US Army Engineer Research & Development Center
- Risk Vulnerability Assessment of Navigation Lock Projects** ~ Dr. Will McMahon, Yazmin Seda-Sanabria, US Army Engineer Research & Development Center
- Numerical Study of a Suspension Bridge Tower Leg Subjected to a Large Close-in Detonation** ~ Dr. James O'Daniel, James C. Ray, US Army Engineer Research & Development Center
- Physical Vulnerability Assessment of Water Supply Systems** ~ Dr. Will McMahon, US Army Engineer Research & Development Center
- Embankment Dams Blast Research and Vulnerability Assessment Methodology** ~ Todd Hill, U.S. Bureau of Reclamation
- Fixed Wheel and Radial Gate Blast Failure Modes and Mechanisms** ~ Martin Chariva, Leroy Smith, Larry Nuss, US Bureau of Reclamation

**Thursday Afternoon, November 3****Track One****Alternative Ship Shock Testing Systems****Chair:**

- Cavity Dynamics and the Development of a Non-Explosive Ship Shock Testing System** ~ Dr. Georges Chahine, Dynaflo, Inc.
- DockShock: An Introduction to the DockShock** ~ Dr. Russel Miller, Roger Bagbey, Erv Pettersen, and Dr. Christopher Mairs, Anteon Corporation
- DockShock: Predicting Target Response** ~ Dr. Russel Miller, Dr. Christopher Mairs, Anteon Corporation
- DockShock: System Design Considerations** ~ John Tullai, Christian Whitney, Anteon Corporation

**Track Two****Analysis Results****Chair: Mr. Jay Ehgott, ERDC**

- A Diagnostic Method for Predicting Maintenance Requirements in Rotating Equipment** ~ Kevin Hunt, William Lindsay, Dofasco, Inc.
- Soil Properties From Low-Velocity Probe Penetration** ~ Dr. Jerome Johnson, US Army Engineer Research and Development Center, CRREL, Dr. Donald Cargile, Dr. Donald Smith, US Army Engineer Research & Development Center
- Sensitivity Analysis of Shot Peening Parameters Using Numerical Model** ~ Rengas Venkataraman Dr. Abdalla Elbella, Sridevi Earmani, Bradley University
- Use of Seismic Surface Measurements for Assessment of Ground Improvement at Reclaimed Land** ~ Prof Azm Al-Homoud, American University of Sharjah

**Track Four****Working Group 13 ~ ANSI Accredited Standards Committee S2****Chair: Mr. Pete Loeffler, NSWCCD/UERD**

Join Working Group 13 of ANSI Accredited Standards Committee S2, Mechanical Vibration and Shock to review the current draft standard "Shock Test Requirements for Equipment in a Rugged Shock Environment." The goal of the working group is to write a standard that will be widely adopted by manufacturers of equipment used in rugged environments. All interested parties are invited to attend this open session to discuss the implementation and application of the standard.

**UJERD Tools Implementation of Principle Component Analysis and Application to UNDEX Barge Test Data from an Isolated Raft** ~ Eric Luft, Paul Mantz, Naval Surface Warfare Center Carderock Division  
**Application of VIRGINIA COTS Lessons Learned to Future Ship Designs** ~ Stephen Foltz, General Dynamics / Electric Boat  
**UNDEX Testing of Representative Hull Structure for the General Dynamics Littoral Combat Ship** ~ Dr. Paul Franklin, Eugene Miller, George Camp, Bath Iron Works

## Friday Morning, November 4

### *Tour of Mississippi River Lock*

Information on the tour was not available at time of publication. Details will be available shortly at [www.saviac.org](http://www.saviac.org). Pre-registration is required to assure space, so please sign up for this tour on your Registration Form.

### *Guest Program*

**Plantation Tour & Lunch** - Tuesday, 9:00 AM - 5:00 PM, Cost \$40.00 - Journey through our beautiful byways visiting two historic plantations where fields of sugarcane and acres of cotton sway in the breeze. Come with us and glimpse a part of history preserved in these stately plantation homes. Have your passport ready to enter the Creole world of Louisiana at San Francisco Plantation, a historic sugar plantation built in 1805 as it transports you into Louisiana's Creole Culture. Located on the Mississippi River between the historic cities of New Orleans and Baton Rouge, Louisiana, Oak Alley Plantation has been called the "Grande Dame" of the Great River Road. Nowhere else in the South will you find such a spectacular setting! The quarter-mile canopy of giant live oak trees, believed to be nearly 300 years old, forms an impressive avenue leading to the classic Greek-revival style antebellum home. A buffet lunch will be served at Oak Alley.

**Garden District & Shopping on Magazine St** - Wednesday, 10:00 AM - 3:00 PM, Cost \$32.00 - Century-old oaks umbrella St. Charles Avenue, known locally and nationally as "The Avenue". These gracious mansions are a statement of lifestyle held in the late 1800s and remain today as they have passed from generation to generation, unchanged in basic design and décor. Note the different styles and especially the classic Greek Revival homes. Guests will tour the Elms Mansion first and walk around the Garden District. Next stop, a shopping spree in the Garden District! Among the most interesting of any New Orleans area, eclectic Magazine Street is lined with appealing specialty shops, fabulous boutiques and century-old warehouses selling house wares, pottery; unfinished, country and period furniture, chandeliers; clothing, books, fine papers, linens, glass, silly toys, china, soaps and incense, antiques from the late 1800s, art, food, clothing and desirable jewelry - costume and the real thing. Lots of best little buys and excellent quality items can be found here (at every price) to impress shoppers. Sophisticated or shabby chic, decorators hit pay dirt here, finding wonderful antiques and faux-antiques. Among the elegant treasures are architectural artifacts, Aubusson pillows and Oriental rugs. A gourmet boxed lunch will be provided.

**New Orleans Unmasked, Longue Vue House** - Thursday, 10:00 AM - 2:00 PM, Cost \$30.00 - The home and gardens was born of the dreams of Edgar and Edith Stern, pillars of the New Orleans community. It is the combination of the Sterns working with landscape architect Ellen Biddle Shipman and architects William and Geoffrey Platt that created this wonderful oasis of beauty in the center of New Orleans. The Longue Vue House is one of the last great houses to be custom-built in America, taking the Platt brothers three years (1939-1942) to create. Guests will take a tour of the house and gardens and then enjoy a gourmet boxed lunch in the Play House. The remainder of the tour will be a bus trip through the heart of the city where attendees can see everything from the French Quarter to Lake Pontchartrain to the Garden District.

# Tutorial Descriptions

Sunday, October 30

## **Theoretical Background and Best Practice Using DDAM**

**Mr Tony Abbey**

The course is aimed at engineers who are just starting to use the DDAM method, or existing users who need some guidance as to practical usage. The examples use NEiNastran, but the technique and ideas presented are generic. No background in dynamic analysis is required as the basics of modal analysis will be covered. Any theory will be based on a practical engineering approach. The course will look at the background to the DDAM method, considering the evolution of the technique and the current specification. The theoretical basis of the method will be covered from a practical engineering perspective with the use of simple examples to illustrate the various stages. Several example DDAM analysis will be carried out using NEiNastran DDAM solution to illustrate the process. Full interpretation of the results will be given with attention paid to understanding what are the design drivers in each case and what engineering judgements can be made from the data. Typical problems with DDAM analysis will be shown, traps to avoid and best practice. Finally a strategy for dealing with large models is presented. The need to reach a target Modal Effective mass and the potential for many hundreds of modes being required is critical issue in the Industry and is fully addressed. Attendees will be given a full set of notes including background modal analysis techniques.

## **Beyond the Shock Response Spectrum**

**Mr. David Smallwood**

The method of Shock Response Spectra (SRS) is reviewed. The SRS is defined and the advantages and disadvantages are discussed. Temporal and spectral moments are then described that can be used independently to describe shock or used to supplement the SRS. Methods for synthesizing shocks that will match the SRS and the temporal moments are discussed. Implications of the uncertainty theorem when describing shocks are discussed. Several methods that can be used in place of the SRS to characterize shocks are then described. These include the method of least favorable response, wavelets, and the Karhunen-Loeve expansion.

## **UNDEX Analysis**

**Mr. Fred Costanzo, Dr. Ray Daddazio**

Description not available at time of printing.

## **Dynamic Pressure Measurements for Munitions, Ordnance, and Other Testing: Part Science and Part Art**

**Dr. Patrick Walter**

This tutorial first encompasses the physics of dynamic pressure transducers (i.e., how they work). Once the operating principals of these transducers are understood, they must be properly interfaced to the pressure environment they are intended to measure. Next, their output signal must be passed with fidelity through appropriate signal conditioning and cabling for recording. In harsh environments, other measurands (e.g., acceleration, strain, temperature, ionization products of a detonation, etc.) can also superpose as additive or multiplicative noise levels on the desired pressure signal. It must then be validated that the recorded signal contains only pressure information. If not, corrective action must be taken. Finally, checks must be performed on the resultant data to assure that it was not unknowingly constrained by the bandwidth of the recording system. At this point in time, the data can be certified as valid and representative of the desired physical phenomenon to be measured. This tutorial encompasses all of these topics.

## **DDAM using MSC.Software Tools**

**Mr. Barton McPheeters**

A short primer showing both the basics and advanced procedures for using MSC.Nastran to perform DDAM Analyses. This will include basic run procedures and setting up an input deck, Nastran options and non-standard capabilities such as mode-by-mode output. This class will focus on using the new SOL 187 DDAM capability available since V2004, but will include all you need to know to use V2001 and earlier versions. It will also focus on using MSC.Patran as the pre-processor for DDAM SOL 187, but will include all the information one needs to run Nastran without Patran or any pre-processor. The class will cover the details of how the procedures work and what all the files mean as well as the basic run procedures. The goal of the class is to teach a user all they need to run DDAM with MSC.Nastran, and to understand the inputs and outputs we use in order to provide insight into the process instead of treating it like a black box.

## **Shock Response Spectrum - Uses & Abuses**

**Mr. Tim Edwards**

The shock response spectrum (SRS) is by far the most widely used tool for analyzing shock data. Although quite useful, the SRS does have limitations. This tutorial will illustrate both the proper use and exploitation of the SRS. Both analysts and testers will find this tutorial useful. Topics will include: Definition of the shock response spectrum; Common SRS ordinates; SRS computation including the use of digital filters for SRS computation (the Smallwood algorithm); Specifying shock tests including the SRS envelopes and notches and Specifying levels of conservatism; Examples of un-conservative SRS test specifications including failure mechanisms in mechanical systems and misapplication of SRS to MDOF systems; SRS cheating including different waveform types used to achieve a specified SRS; the abuse of haversines; and using the SRS to inflate testing capability; and Alternative descriptions of shock.

### **Calibration, Maintenance, and Operation of the Lightweight and Medium Weight Shock Machines**

**Mr. B. Christopher Grunau & Mr. Jeffery A. Morris**

This course provides a detailed, hands-on overview of the calibration, maintenance, and operation of the Lightweight Shock Machine and the Medium Weight Shock Machine. This class is tailored for those who are technical operators of the lightweight and medium weight shock machines. The course covers the rules and guidelines of machine operation, according to MIL-S-901D(NAVY) standards, routine maintenance procedures, and required machine calibration procedures.

### **Data Validation and Editing**

**Mr. Allan Piersol**

This short course surveys the most common errors that occur during the acquisition of shock and vibration data, including signal clipping, transducer and/or amplifier saturation, excessive background noise, intermittent noise spikes and wild points, power line pickup, spurious trends and signal dropouts. Practical procedures to detect such errors and wild points, power line pickup, spurious trends and signal dropouts. Practical procedures to detect such errors by visual inspections of the data signals and/or simple analysis of the signals are detailed. For those cases where the resulting anomalies can be removed from the data, appropriate data editing techniques are discussed. Emphasis is given to pyroshock data, which is particularly vulnerable to data acquisition errors. The presentation concentrates on graphical illustrations of the detection and editing procedures rather than an analytical treatment of the problem. This short course is intended for all engineers and scientists that are engaged in the acquisition and analysis of all types of analog data. The material is presented at a level appropriate for entry level engineers and technicians, but should also be beneficial to more experienced laboratory engineers and managers of data acquisition and analysis facilities.

### **Productive DDAM Analysis Using ABAQUS**

**Dr. David Winkler**

An effective approach to performing DDAM analysis is available using Version 6.5 of the ABAQUS linear and nonlinear FEA program. Developed as a free product called DDAM for ABAQUS, it allows DDAM-specific input through graphical and non-graphical user interfaces. Emphasis has been made on providing the Navy with ease-of-use, standardization of output results, and a high degree of automation. Many features have been incorporated to help enhance the productivity of any DDAM practitioner. For example, a closely spaced modes method has been included as an optional analysis procedure. As an add-on module that is separate from the core ABAQUS program, the application can be rapidly enhanced to meet special needs of the shock community. This tutorial will teach the proper usage of DDAM for ABAQUS and will highlight particular features and advantages of the capability as illustrated by examples. The material is suitable for both managers and analysts.

### **Basis of Elementary Shock Isolation System Design**

**Dr. D. Christopher Merrill, P.E.**

Shock isolation system design is sometimes performed by persons that have not had the opportunity to design shock isolation systems for the various types of shock tests and inputs encountered in today's DOD environment. This short course is intended to provide a framework that the designer can use to direct a shock isolation design with minimum false starts. Explanations are provided for the basic engineering issues and terminology encountered in shock isolation system design problems. Possible selection criteria that the designer may encounter during design of a shock isolation system are identified. Two design examples are provided that demonstrate incompatibilities sometimes encountered. Finally, the basic steps of the design process algorithm are reviewed. This course is directed at the design or analytical professional that has limited experience with shock isolation system design or the design professional with major expertise in a specialized area of shock isolation that wants to investigate more global excitations (i.e. vehicular shock expert that is interested in parallels with marine or seismic shock).

### **ESS, HALT and HASS**

**Mr. Wayne Tustin**

We will briefly examine the history of ESS, commencing in 1979 and updating to present HALT and HASS practices aimed at increasing reliability, mainly of electronics. We will mention temperature ramping but focus on random vibration. We will glance at multiple electrodynamic shakers as a very expensive way to get multiaxis vibration. Then focus on cheaper multiaxis pneumatic bangers - RS or repetitive shock set ups.

### **Introduction to Vibration Testing**

**Mr Jon Wilson**

This tutorial introduces the novice to vibration testing and provides a comprehensive review for the experienced practitioner. It concentrates on conceptual understanding and minimizes mathematics. It is recommended for technicians, engineers, program managers, and others who need a basic understanding of the fundamentals of vibration testing. Topics covered include the definition and nature of vibration; fundamental structural dynamics; sine, complex and random vibration; spectra; vibration measurement and different measurement systems; shakers and shaker system characteristics; and fundamental fixture design and analysis. Student participation and questions are encouraged. Numerous references are cited.

**Monday, October 31**

### **An Introduction to ABAQUS**

**Mr Karl D'Souza**

ABAQUS is a family of general purpose finite element analysis tools for the analysis of complex engineering problems. ABAQUS/CAE is an

interactive application for constructing, analyzing, and visualizing finite element models and results. ABAQUS/Standard is a general purpose finite element code, which handles a wide variety of linear and nonlinear analyses. ABAQUS/Explicit uses explicit time integration for linear and nonlinear problems, and is especially suited for modeling transient effects. This tutorial provides an overview of ABAQUS, its capabilities, and examples of applications. The tutorial is suitable for beginners in finite element analysis, experienced users of other software, and those interested in a survey of recently added features.

### **Review of Structural Dynamics**

**Prof Josh Gordis**

Description not available at time of printing.

### **Naval Shock Analysis and Design**

**Dr. Rudy Scavuzzo**

First an overview of content of SVM-17, Naval Shock Analysis and Design, by Rudy Scavuzzo and Henry Pusey will be presented. The monograph briefly covers naval shock testing machines and vehicles, a detailed treatment of normal mode theory and its relationship to the Dynamic Design Analysis Method (DDAM); special considerations of DDAM including allowable stresses are covered in Chapter 3. Whole ship shock analyses including fluid-structure interaction and shock analyses in the plastic regime are presented in Chapters 4 and 5, respectively. Emphasis in the tutorial will be made on Chapter 5, shock analyses in the plastic regime. Energy in the modes of vibration can be directly related to the shock spectrum. This concept is very important because it means the energy in a system is bounded. Thus, plastic deformation or plastic work from shock in an equipment structure is also bounded. After considering the energy in shock, plastic analyses in piping and foundations from shock inputs will be presented. Analytical results will be compared to test data.

### **Blast Resistant Structural Connections and Detailing**

**Prof. Ted Krauthammer**

This course will provide a brief review of blast loads and their effects, and then address the behavior and design of blast resistant structural connections in both reinforced concrete and steel construction. Detailed examples, and research results will be provided.

### **The Measurement and Utilization of Valid Shock and Vibration Data**

**Dr. Patrick Walter**

Significant focus is often provided to applying sophisticated analysis techniques to the data resulting from shock and vibration tests. However, inadequate focus is often provided to assuring that valid shock and vibration data are acquired in the first place. This tutorial attempts to correct this deficiency. For the instrumentation novice it will provide an introduction to shock and vibration measurements, the physics of piezoelectric and silicon based accelerometers, and motion characterization. For the experienced test technician or engineer it will provide additional insight into topics such as optimized measurement system design, accelerometer and measurement system calibration, accelerometer mounting effects, analog filtering, data validation, data utilization, and more. For the analyst or designer it will provide a series of simple observations and back of the envelope calculations that he/she can make on data to validate its credibility before using it in product design.

### **Non-Linear FE Analysis for Shock and Vibration**

**Mr. Tony Abbey**

The course is aimed at engineers who are just starting to use nonlinear FE dynamic analysis with impacting surfaces to investigate shock and vibration, or existing users who need some guidance as to practical usage. The examples use NEiNastran, but the technique and ideas presented are generic. No background in dynamic analysis is required as the basics of modal analysis and non-linear transient analysis will be covered. Any theory will be based on a practical engineering approach. The course will look at the background to dynamic analysis using modal methods, linear transient and nonlinear transient analysis. Finally the use of contact surfaces to model accurate impulsive loads is covered. The theoretical basis of the method will be covered from a practical engineering perspective with the use of simple examples to illustrate the various stages. Practical guidelines on carrying out a prior modal survey, estimating time step size and impact duration prior to the transient analysis will be shown. Several example nonlinear analysis will be carried out using NEiNastran to illustrate the process. Full interpretation of the results will be given with attention paid to understanding what are the design drivers in each case and what engineering judgements can be made from the data. Typical problems with nonlinear analysis will be shown, traps to avoid and best practice. Finally a strategy for dealing with large models is presented. Model size and solution times are becoming ever larger, and the importance of reducing analysis and data extraction to practical limits is explored. Attendees will be given a full set of notes including background modal analysis techniques.

### **Shock and Vibration Analysis Using MATLAB**

**Prof Kjell Ahlin**

In recent years, systems for multichannel data acquisition of shock and vibration signals have become available at much lower cost than before. In the meantime, Matlab has become a leading software for engineering computations at universities as well as in industry. Matlab can be used as a very cost effective solution for the engineer who needs powerful software for analyzing shock and vibration data. The tutorial will give an overview of how Matlab can be used to analyze data from typical applications.

### **Overview of Underwater Shock and DDAM**

**Prof. Young Shin**

This three hour short course on naval ship shock analysis and design will be presented by Dr. Young Shin, Professor of Mechanical Engineering at the Naval Postgraduate School. It will provide engineers, scientists, and naval architects a general overview of underwater explosion phenomena, structural response analysis, fluid-structure interaction, shock spectrum and the Dynamic Design Analysis Method. It will cover the free-field problem, the drystructure problem, the fluid-structure interaction and shock spectra problem, shock qualification of internal equipment using DDAM and Hopkinson's scaling problem.

### **A Primer on Explosion Effects in the Air, Water, and Soil**

**Dr. Bob Welch**

The effects of detonations from high explosives have unfortunately become a challenge for the civilian as well as the military community. This tutorial provides basic information about explosions for the practicing engineer. Blast effects phenomena associated with explosions in air, water, and geologic media are described. Hopkinson scaling relations are discussed that dictate how explosion effects scale with charge size and distance. Simple equations are given that predict blast field parameters in water, air, and soil as a function of charge weight and range. Explosion-induced cratering phenomena in soil and rock are described and predictive graphs provided. Airblast reflection phenomena at rigid interfaces are covered and relationships that quantify the reflected waves as a function of incident pressure and incident angle are given. Airblast inside tunnels from high explosive detonations is discussed. The tutorial material is taken from unclassified Corps of

Engineers technical manuals, classical literature and papers on the subject, and the author's research experience.

### **UNDEX and Acoustic Analysis with ABAQUS**

**Dr Jeffrey Cipolla**

This tutorial describes the analysis of problems of particular interest to the shock and acoustics community using the general purpose finite element code, ABAQUS. In shock and acoustic analyses, it is useful to distinguish between 'heavy fluid' problems, in which the mass and stiffness of the fluid is an important factor in the structural motion, and 'light fluid' problems, in which parts of the fluid-structure interaction effect may be neglected. 'Heavy fluid' applications include underwater shock and acoustics, and some geotechnical problems. 'Light fluid' problems include metal structures in air. In either case, modal analysis, steady-state dynamic (time-harmonic) analysis, and transient problems are of interest. The use of ABAQUS/Standard for general steady state and modal analysis is described, including problems with heavy fluid, light fluid, solid structures, and infinite exteriors. ABAQUS/Explicit is particularly well-suited to UNDEX problems, which are characterized by rapid transient loads due to incident waves, as well as fluids of infinite extent. Modeling issues for each class of problems will be discussed.

### **Damping Analysis and Technology**

**Dr. Peter Torvik Mr. Ahid Nashif, Dr. Jack Henderson**

Damping is first discussed as a material property, and such measures of material damping as the unit damping, the material loss factor and the complex modulus are introduced and discussed. The different classes of materials with high inherent damping properties are introduced and the characteristics of each are described. Damping is then discussed as a system property with such system level measures as the fraction of critical damping, the logarithmic decrement, the resonant amplification factor (quality factor), bandwidth, Nyquist plot, hysteresis area, and complex stiffness introduced. The limitations of each are discussed, and relationships between various measures are given. The relationship between material damping and system damping, the challenges in extracting material properties from the system response, and the influence of nonlinearities on the measurement of damping are also given. The critical role of damping in the reduction of vibratory amplitudes at resonance is emphasized.

### **Application Of The USA Code To Underwater Shock Problem**

**Dr. John DeRuntz**

The purpose of this course is to provide engineers, scientists, and naval architects a working knowledge of the theoretical foundations and practical details of the USA (Underwater Shock Analysis) code for usage in design and analysis problems of submerged and semi-submerged structures in an explosive environment.

### **Blast Effects and Blast Resistant Design**

**Prof. Ted Krauthammer**

This course will address in detail blast loads and their effects associated with high explosive materials, and the differences between external and internal explosions. The behavior and design of blast resistant structural systems will be discussed next, with references to available design guidelines, computational support tools, and test data. Examples, and research results will be presented and discussed.

## **SAVIAC Corporate Supporters**

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## **76th S&V Symposium Current Exhibitors**

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# SAVIAC Block Funding Organizations (FY-04)

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Development Center - ITL  
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Center - Crane

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Center - Panama City  
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System Center & HQ  
Sandia National  
Laboratories  
US Army Research  
Laboratory

These are FY-04 block funding organizations. FY-05 organizations are in process of being compiled and will be acknowledged at the Opening Session.

## 76th S&V Symposium Registration Form

The standard registration form for a single attendee is on the following page. This year SAVIAC has introduced new options and expanded options introduced last year. These include Corporate Sponsorships for those companies sending multiple attendees as well as a tutorial only option. To find out more and get the forms please go to our web site at [www.saviac.org/registration\\_options1.htm](http://www.saviac.org/registration_options1.htm). Questions should be directed to Darnise Johnson, 301 596-0100, [darnise.johnson@saviac.org](mailto:darnise.johnson@saviac.org).

## 76th S&V Symposium Clearance Form Instructions

### IMPORTANT INSTRUCTIONS

- This Security Certification must be faxed to:**  
Address: US Army Engineer Research and Development Center  
ATTN: Linda McGowan  
Fax: (601)-634-3897 or 2995  
Verification Number: (601)-634-4218, 3527, or 2776
- TELEPHONE REQUESTS WILL NOT BE ACCEPTED.
- GOVERNMENT ATTENDEES:** Send clearances directly to ERDC.  
**CONTRACTORS:** Send clearances through your user agency for need-to-know verification and forward to ERDC.
- Clearance certifications must be received no later than October 9, 2005.
- If you wish to receive the CLASSIFIED Proceedings and/or the Critical Technologies Journal, you must check the appropriate box(es) at the top of the form

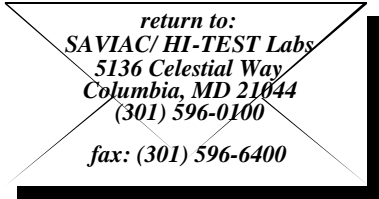
### Hotel Accommodations

The Symposium, including the unclassified sessions, will be held at the Royal Sonesta Hotel. A block of rooms have been reserved at the rate of \$133.00 per night. Reservations must be made by October 9th. When making your reservation identify yourself as an attendee of the Shock and Vibration Symposium. The room rate is the same for US Government and private sector employees. For reservations, please contact:

The Royal Sonesta Hotel  
300 Bourbon Street  
New Orleans, LA 70130  
504-586-0300 or 800-SONESTA  
[www.sonesta.com/neworleans\\_royal/](http://www.sonesta.com/neworleans_royal/)

# Registration Form

76<sup>th</sup> Shock and Vibration Symposium  
October 30 – November 4, 2005  
New Orleans, LA



Name: \_\_\_\_\_

Organization: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_ Email: \_\_\_\_\_

**REGISTRATION FEE: \$845 (Discounted price of \$745 granted to registrations, INCLUDING PAYMENT INFORMATION, if received by SAVIAC by October 9, 2005)**

**I WILL BE ATTENDING (Check all that apply, send appropriate clearance form to US Army ERDC)**

- Unclassified  Classified

**TUTORIALS: \$250 each/\$350 if not attending Symposium (See the policy on Symposium attendance prior to registering) Sunday, Oct 30**

- Theoretical background and best practice using DDAM – Tony Abbey 8-11 AM
- Beyond the Shock Spectrum - Temporal & Frequency Moments, the Product Model, & Uncertainty – Dave Smallwood 8-11 AM
- UNDEX Analysis – Fred Costanzo & Ray Daddazio 8-11 AM
- Dynamic Pressure Measurements for Munitions, Ordnance, and Other Testing: Part Science and Part Art – Pat Walter 8-11 AM
- DDAM Using MSC Software Tools – Bart Mcpheeters 12-3 PM
- Shock Response Spectrum – Uses & Abuses – Tim Edwards 12-3 PM
- Calibration, Maintenance and Operation of the LWSM & MWSM – Chris Grunau & Jeff Morris 12-3 PM
- Data Validation and Editing – Allan Piersol 12-3 PM
- Productive DDAM Analysis Using ABAQUS – David Winkler 4-7 PM
- Basis of Elementary Shock Isolation System Design – D. Christopher Merrill 4-7 PM
- ESS, HALT & Hass – Wayne Tustin 4-7 PM
- Introduction to Vibration Testing – Jon Wilson 4-7 PM

**Monday, Oct 31**

- An Introduction to ABAQUS – Karl D’Souza 8-11 AM
- Review of Structural Dynamics – Josh Gordis 8-11 AM
- Naval Shock Analysis & Design – Rudy Scavuzzo 8-11 AM
- Blast Resistant Structural Connections and Detailing – Ted Krauthammer 8-11 AM
- The Measurement and Utilization of Valid Shock and Vibration Data – Patrick Walter 8-11 AM
- Non-Linear FE Analysis for Shock and Vibration – Tony Abbey 12-3 PM
- Shock and Vibration Analysis Using MATLAB – Kjell Ahlin 12-3 PM
- Overview of Underwater Shock and DDAM – Young Shin 12-3 PM
- A Primer On Explosion Effects In the Air, Water, and Soil – Bob Welch 12-3 PM
- UNDEX and Acoustic Analysis with ABAQUS – Jeff Cipolla 4-7 PM
- Damping Analysis and Technology – Jack Henderson, Peter Torvik & Ahid Nashif 4-7 PM
- Application of the USA Code to Underwater Shock Problems - John DeRuntz 4-7 PM
- Blast Effects and Blast Resistant Design – Ted Krauthammer 4-7 PM

**SOCIAL EVENT:** Wednesday evening, Registered attendee: no charge/Guest charge: \$10  
 yes, I will attend  yes, I will attend with 1 guest  no, I will not attend

**GUESTS’ PROGRAM:**  
Tues Plantation Tours & Lunch  guest attending Tues (11/1): \$40  
Wed Garden District & Shopping on Magazine St  guest attending Wed (11/2): \$32  
Thur New Orleans Unmasked, Longue Vue House  guest attending Thur (11/3): \$30

**TOUR:** Friday 11/4 Mississippi River Lock  yes (indicate # of persons) \_\_\_\_\_ Names: \_\_\_\_\_

**By registering for the Symposium you are agreeing to abide by the rules and regulations of Symposium conduct set by SAVIAC. These rules are available for viewing at [www.saviac.org](http://www.saviac.org)**

**PAYMENT INFORMATION: Please provide complete payment information.** Checks should be made payable to SAVIAC/HI-TEST. Payment may also be made by AMEX, Visa, or Master Card. Purchase orders are not accepted. Bank transfer fees are the responsibility of the attendee. **A \$50 administrative fee will be charged to ALL cancellations received after October 9, 2005. Substitutions are accepted.**

Check  AMEX  Visa  Master Card Card # \_\_\_\_\_

Exp. Date \_\_\_\_\_ Cardholder Name (print): \_\_\_\_\_

AMOUNT PAID \_\_\_\_\_ Cardholder Signature: \_\_\_\_\_

**PLEASE FAX FORM & CREDIT CARD INFO TO (301) 596-6400 BY OCTOBER 9, 2005 TO RECEIVE DISCOUNT  
YOU MAY ALSO REGISTER ON THE WEB AT [www.saviac.org/76\\_symposium.htm](http://www.saviac.org/76_symposium.htm)**

# CLEARANCE FORM FOR CLASSIFIED SESSIONS

## 76<sup>th</sup> Shock & Vibration Symposium

### New Orleans, LA

<b>FAX Copy To:</b>	ERDC Security ATTN: Linda McGowan (601)-634-3897 or 2995 (FAX) (601)-634-4218, 3527, or 2776 (Verification)
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  Critical Technologies Journal

#### PART I: PERSONAL DATA (To Be Completed By Attendee)

Name: \_\_\_\_\_ Social Security No \_\_\_\_\_  
(Last) (First) (Initial)

Place of Birth: \_\_\_\_\_ Citizenship: \_\_\_\_\_ Date of Birth: \_\_\_\_\_

Employer (Company/Gov't Agency/Military): \_\_\_\_\_

Employer's Address: \_\_\_\_\_

Classified Mailing Address: \_\_\_\_\_

Email: \_\_\_\_\_ Phone No: ( ) - \_\_\_\_\_ Fax No: ( ) - \_\_\_\_\_

Signature of Attendee: \_\_\_\_\_

#### PART II: SECURITY CLEARANCE INFORMATION (To Be Completed By The Attendee's Security Officer)

By signing below, I certify the attendee meets the requirements for access to classified material in accordance with Executive Order 12958, DoDR 5200.1-R, and DoDM 5220.22M (as applicable).

Clearance Level: \_\_\_\_\_ Investigation Type: \_\_\_\_\_

Date Clearance Granted: \_\_\_\_\_ Date of Investigation: \_\_\_\_\_

Granted By: \_\_\_\_\_ Authorized NATO Access: \_\_\_\_\_  
(Yes / No)

Security Officer \_\_\_\_\_  
 Name (Print): \_\_\_\_\_  
(Last) (First) (Initial)

Title: \_\_\_\_\_ Organization: \_\_\_\_\_

Phone No: ( ) - \_\_\_\_\_ Fax No: ( ) - \_\_\_\_\_

\_\_\_\_\_  
 Signature of Security Officer Date

#### PART III: NEED-TO-KNOW (Contractors Only) (To Be Completed By The Government Contracting Activity Officer)

By signing below, I certify the attendee has the NEED-TO-KNOW to attend the classified portions of this symposium in accordance with Executive Order 12958, DoDR 5200.1-R, and DoDM 5220.22M (as applicable).

Name (Print): \_\_\_\_\_  
(Last) (First) (Initial)

Title: \_\_\_\_\_ Organization: \_\_\_\_\_

Phone No: ( ) - \_\_\_\_\_ Fax No: ( ) - \_\_\_\_\_

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 Signature of Contracting Activity Officer Date



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***In the July 2005  
Current Awareness  
Newsletter***

***76th Shock & Vibration  
Symposium Preliminary  
Program***

***New This Year  
Tutorials on Sunday, Monday  
New Registration Options***

The Current Awareness newsletter is published by the Shock and Vibration Information Analysis Center, which is operated by HI-TEST Laboratories, Inc., under contract to the U.S. Army Engineer Research and Development Center.

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