

# STAPP CAR CRASH CONFERENCE®



Westin Kierland Resort & Spa  
Scottsdale, Arizona

November 3-5, 2010



54<sup>th</sup>



# Welcome

The Stapp Car Crash Conference is the premier forum for the presentation of research in impact biomechanics, human injury tolerance, and related fields that advance the knowledge of land-vehicle crash injury protection. The conference provides an opportunity to participate in open discussion regarding the causes and mechanisms of injury, experimental methods and tools for use in impact biomechanics research, and the development of new concepts for reducing injuries and fatalities in automobile crashes.

The papers that will be presented at this year's Stapp Conference cover a range of timely and important topics in impact biomechanics and occupant protection. These topics include Biomechanical Test Methods, Data Analysis, and ATD Biofidelity; Injury Risk Assessment Based on Real-World Data; Head and Neck Injury Biomechanics and Anthropometry; Injury Biomechanics Issues in Military Environments; Injury Biomechanics in Lateral Impacts; and Thorax and Abdomen Biomechanics and Testing.

We would like to thank all of the authors as well as members of the Stapp Advisory Committee for the significant efforts that have been put forth in preparing and reviewing

these papers. We encourage all attendees to use the time provided following each paper presentation to offer comments and questions to the presenters. This is a valuable opportunity for further clarification of the research from which all in attendance will benefit. It is hoped that the material presented at this year's conference will provide ideas and motivation for further research that will lead to improvements in occupant protection systems. We also encourage those who are active in impact biomechanics research to submit abstracts for papers to be included in next year's Stapp Conference, which will be held at the Hyatt Regency in Dearborn, Michigan.

On behalf of the Stapp Car Crash Conference Advisory Committee, we invite you to participate in what promises to be a stimulating and enjoyable 54th Stapp Conference at the Westin Kierland Resort and Spa in Scottsdale, Arizona.

**Lawrence W. Schneider, General Chair**  
**The University of Michigan**

**Leda L. Ricci, Executive Director**  
**The University of Michigan**



## **Dr. John Paul Stapp, In Memoriam, 1910-1999**

A bronze bust of Dr. John Paul Stapp Col USAF MC is displayed each year at the Stapp Car Crash Conference. It was created by artist Walter Rawley of Ruidoso, New Mexico, and donated by Dr. Stapp. The bust depicts Colonel Stapp when he rode the rocket sled at Holloman Air Force Base, subjecting himself to injury-producing accelerations in order to study human tolerance to high-g environments. In his final sled ride in 1954, Dr. Stapp was accelerated to 632 miles per hour in five seconds, and was then decelerated to a stop in 1.4 seconds, experiencing a peak sled deceleration in excess of 40 gs.

**Visit our website at <http://www.stapp.org/>**

# Stapp Advisory Committee

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**John P. Stapp**, 1955-1999 Permanent Chairman  
Colonel USAF MC

**Richard F. Chandler**, 2010 Chairman of the Board  
FAA Civil Aeromedical Institute, ret.

**Lawrence W. Schneider**, 2010 General Chair  
The University of Michigan

**Leda L. Ricci**, Executive Director  
The University of Michigan

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<b>Farid Bendjellal</b>	Britax Childcare Limited
<b>John M. Cavanaugh</b>	Wayne State University
<b>Richard F. Chandler</b>	FAA Civil Aeromedical Institute, ret.
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<b>Priya Prasad</b>	Prasad Engineering, LLC
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<b>Lawrence W. Schneider</b>	The University of Michigan
<b>Xavier Trosseille</b>	LAB PSA Peugeot Citroën RENAULT
<b>Beth A. Winkelstein</b>	University of Pennsylvania
<b>Jac S.H.M. Wismans</b>	Safeteq/Chalmers University/Graz Technical University
<b>King H. Yang</b>	Wayne State University

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## 2010 CONFERENCE HOST

University of Michigan Transportation Research Institute

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# Conference Registration Information

## Registrations may be faxed to the Stapp registration office until October 29, 2010.

- Complete and return the registration form provided in this program with payment to the address or fax number listed at the top of the form.
- Payments may be made by major credit card or check. Electronic funds transfers are not accepted.
- Conference badges will be available at the registration desk.
- Registration for the conference includes one copy of the *Stapp Journal*, technical session attendance, continental breakfasts, refreshment breaks, and evening receptions. Student registrations do not include the *Stapp Journal*.

## ON-SITE REGISTRATION — Culturekeepers Hall South

Tuesday, November 2	3:30 PM – 6:00 PM
Wednesday, November 3	7:30 AM – 4:00 PM
Thursday, November 4	7:30 AM – 4:00 PM
Friday, November 5	7:30 AM – 9:00 AM

## Stapp Car Crash Journal Pickup

Pre-registered attendees, as well as those registering on-site, may pick up their copy of the *Stapp Car Crash Journal* along with a conference badge in the **Culturekeepers Hall South**.

Additional copies of the *Stapp Journal* may be purchased for \$136 list price. Also available for purchase at \$408 list price is the newly updated CD collection of Stapp technical papers. The Stapp CD includes papers published from 1966 through 2010 and the 1993 and 1997 Proceedings of the Child Occupant Protection Symposiums. The collection is fully searchable and includes 1,366 technical papers in PDF format that can be viewed and printed. Individual documents can be searched for key words and phrases using Adobe Acrobat Reader, which is included with each CD-ROM. The *Stapp Journal* and the Historical Collection of Stapp papers on CD may be ordered by calling (724) 772-4086 [toll free U.S. and Canada (888-875-3976)], or by faxing (724-776-3087). SAE members will receive a publications discount based on their membership level.

Email: [CustomerSales@sae.org](mailto:CustomerSales@sae.org); Internet: <http://store.sae.org>

## SAE Publications

SAE publications will not be available for purchase during the conference. Publications are available on the SAE web site at [www.sae.org/bookstore](http://www.sae.org/bookstore).

**For Stapp Conference information, call Zonda Ketola at (734) 936-1114 or E-mail: [zketola@umich.edu](mailto:zketola@umich.edu)**

# Hotel Information

## Location – 6902 East Greenway Parkway

The Westin Kierland Resort and Spa is the host hotel for the Stapp Conference. It is located in Scottsdale and set against the dramatic Arizona skies and picturesque mountain ranges. It is 10 miles from historic downtown Scottsdale and 20 miles (31 minutes) from Phoenix Sky Harbor International Airport.

## Accommodations / Reservations

Reservations at the Westin Kierland Resort and Spa may be made by calling the hotel directly at (480) 624-1202 or registering on-line from the Stapp website –

<http://www.stapp.org>. The room rate for the Stapp Conference is \$179 single/double if you register by **October 20<sup>th</sup>**. A limited number of rooms are available at a government rate. Be sure to identify yourself as attending the Stapp Car Crash Conference.

Please make your reservations early. A one night's deposit is required. Reservations must be cancelled 72 hours (3 days) prior to date of arrival to have your deposit refunded. Reservations requested after **October 20<sup>th</sup>** will be confirmed at the Stapp rate on a space-available basis.



Photo courtesy of the Westin Kierland Resort and Spa.

# Travel Information

## Transportation from the Phoenix Sky Harbor International Airport

**Car Rental** — There are several rental car companies located on site.

Reservations may be made near the baggage claim area. Hertz car rental is also conveniently located at the Westin Kierland Resort and Spa.

**Taxis** — Cab fare from the airport to the hotel is about \$50.00. No fee for additional passengers.

**Car Service** — Airport transportation to The Resort is available through Transtyle Transportation with at least 48 hours notice from your arrival. Call Transtyle directly at (800) 410-5479. Return transportation is available from the Front Drive 24 hours a day.

Curbside Pickup: \$55-Sedan/\$75-SUV

Meet & Greet: \$75-Sedan/\$95-SUV

Sedan will seat up to 3 guests; SUV will seat 6. Gratuity is not included.

## Directions to the Westin Kierland Resort & Spa

### From the East Valley/Tempe/Chandler

From Loop 202 East, access Loop 101 North. Continue for approximately 12 miles and exit at Frank Lloyd Wright Boulevard. Exit left (west) onto Frank Lloyd Wright Boulevard and continue for 2 miles, then turn left (south) onto Scottsdale Road. Turn right onto Greenway Parkway to find The Resort ½-mile ahead on your right.

### From North Phoenix

Take Interstate 17 South and merge onto Loop 101 East. Continue 11 miles to exit at Scottsdale Road. Exit right onto Scottsdale Road and continue for 2 miles to East Greenway Parkway. Turn right to find The Resort ½-mile ahead on your right.

### From Phoenix Airport/West Phoenix

Follow exit signs at Sky Harbor International Airport toward the 24th Street/West Exit. Upon exiting terminal area, follow signs for Interstate 10 West. Merge onto the I-10 West and immediately follow signs to merge onto AZ-51

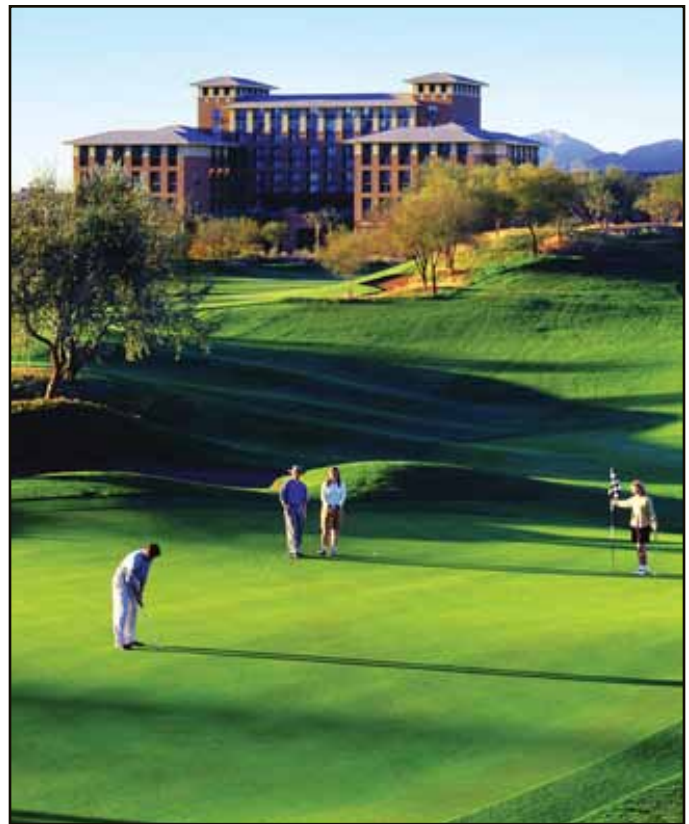


Photo courtesy of the Westin Kierland Resort and Spa.

North. Continue on AZ-51 North for 12 miles to Greenway (exit #12). Exit right (east) onto Greenway and continue for 4.5 miles. The Resort will be on your left, approximately ¼-mile east of 66th Street/Clubgate Drive.

### From South Phoenix/Tucson

Take Interstate 10 West and take the exit ramp to US-60 (Superstition Freeway). Travel east and continue on US-60 and take Loop 101 North (exit #176B). Exit left (west) onto Frank Lloyd Wright Boulevard and continue for 2 miles, then turn left (south) onto Scottsdale Road. Turn right onto Greenway Parkway to find The Resort ½-mile ahead on your right.

## Hotel Parking and Car Rental

The Westin Kierland features a large parking lot directly in front of The Resort for complimentary self parking. Valet parking is available at \$27.00 per day.

Hertz Rental Car is also conveniently located at The Resort in the Front Desk area of the main Resort lobby. Contact Hertz at (480) 624-1000.

## Hotel Amenities

The Westin Kierland Resort and Spa offers many guest facilities, Kierland Golf Club three 18-hole combinations, Agave Spa, 24hr fitness facilities, outdoor heated pools, lighted outdoor tennis courts, area running maps, valet parking, guest services, full service business center, dry cleaning/laundry service, and gift shop. Each room is equipped with high-speed wireless internet access, private voice mail, cable TV, in-room safe, daily newspaper delivery, full bath amenities, coffee maker, iron/ironing board and 24 hour room service. High-speed wireless internet is also available in all meeting rooms and lobby areas.

## Hotel Dining

**Coffee Flats & Snowbowl**s perfect for a morning latte, Starbucks coffee or an afternoon soda and cool cup of gelato. Offers a selection of pastries, cookies and sandwiches, as well as an assortment of gelato flavors and ice cream treats. **The**

**Rim Lobby Lounge** is a great place to meet, relax and enjoy a cocktail. **Deseo** offers a passionate and lively dining experience with a Latin-influenced cuisine. **Nellie Cashman's Monday Club Café** offers casual dining for breakfast, lunch and dinner with a Southwestern-Mediterranean flair. **Brittlebush Bar & Grill** features an innovative Gastropub experience with a Scottish influence. Enjoy a casual lunch or early dinner with a diverse menu that ranges from light appetizers and salads to a more substantial fare. **Waltz & Weiser Saloon** specializes in fine tequilas and whiskeys and offers an upscale bar and appetizer menu. At **Dreamweaver's Canyon Courtyard** enjoy cocktails and appetizers from Waltz & Weiser Saloon while watching the evening sunset and listening to the melodic sounds of Mast Bagpiper Michael McClanathan. **J. Swilling's Pool Bar & Grill** is perfect for whatever you are craving for lunch including smoothies, cocktails, and snacks. **Edie's Range House** is a casual dining spot near the covered driving range and putting green serving express breakfast and lunch items.

## Scottsdale Weather

During November the average temperature is 87 degrees Fahrenheit. For an up-to-date 10-day weather forecast for Scottsdale, visit the following web sites before your departure: <http://www.scottsdalecvb.com/discover-scottsdale/weather/> and [www.weather.com](http://www.weather.com).

# Conference Information

## Speaker-Ready Room — Cushing B

The speaker lounge is available to all authors and co-authors of conference papers.

## Stapp Conference Technical Sessions — Kierland Ballroom 3

- Please check the session schedule in this program for starting times.
- Audio or video recording of presentations or discussions, and taking of photographs during the technical sessions, is not permitted.
- In consideration of the speakers and Conference attendees, please turn off all cell phones when entering the meeting room.

## Message Center

For information on conference-related activities or to leave a message for someone attending the conference, please call the hotel at (480) 624-1000 and ask for the Stapp Conference Registration Desk. All messages will be posted in the Stapp Conference registration area. Fax messages may be sent to the business center (480) 596-8855.

## Business Center

The FedEx Office Business Center is located on the lobby level. It is a full service business center with an Office Representative available 7 days a week to assist you. Hours of operation are Monday-Friday 8am to 7pm and Saturday-Sunday 9am to 5pm. The following services are available in the business center: printing, copying, faxing, binding, computer rental, signs and graphics, packing, FedEx express and ground shipping services.

## Hosted Receptions

Tuesday evening, **Humanetics Innovative Solutions** will host a reception to welcome Stapp Conference attendees at 5:00 in the **Vista Morada**.

Wednesday evening, **DTS** will host a reception immediately following the afternoon technical sessions in the **Vista Morada**.

## Hosted Luncheon

Wednesday afternoon, **Toyota** will host a welcome luncheon for all Stapp Conference attendees from 12:00-2:00 in the **Herberger 3**.

## Hosted Breakfast and Breaks

Wednesday's continental breakfast and refreshment breaks will be provided by **Nissan**.

Thursday's continental breakfast and refreshment breaks will be provided by the **Alliance of Automobile Manufacturers**.

Friday's continental breakfast will be provided by **Ford Motor Company Fund's Driving Skills for Life Program**.

### PRECEDING THE STAPP CONFERENCE

**Tuesday, November 2 — 9:00 AM–4:45 PM — Kierland Ballroom 4**

**38<sup>th</sup> International Workshop on Human Subjects for Biomechanical Research**

**Sponsored by NHTSA/Human Injury Research Division**

Erik G. Takhounts, Chair,  
National Highway Traffic Safety Administration

The purpose of the workshop is to provide a forum for the exchange of ideas and the presentation of ongoing research investigations using human volunteers or surrogates. No registration is required. For additional information, contact:

Erik G. Takhounts, Ph.D.

Human Injury Research Division, NVS-323, W46-471

1200 New Jersey Avenue, SE

Washington, D.C. 20590

Phone: (202) 366-4737

Fax: (202) 366-8546

Email: erik.takhounts@dot.gov

Wednesday, November 3

# Technical Program

In the Kierland Ballroom 3

Audio and videotaping will not be permitted. Please turn off cell phones in the meeting room.  
Smoking will not be permitted in the sessions.

9:20 **WELCOME AND OPENING REMARKS**  
Lawrence W. Schneider, The University of Michigan, General Chair

9:30 **JOHN PAUL STAPP MEMORIAL LECTURE**  
**Injury Biomechanics at The University of Michigan – The Emergence of a New Engineering Discipline**  
John W. Melvin, Ph.D.

## Biomechanical Test Methods, Data Analysis, and ATD Biofidelity

**Co-Chairs:** Stephen W. Rouhana, Ford Motor Company  
Farid Bendjellal, Britax Childcare Limited

10:00 **The Consequences of Average Curve Generation: Implications for Biomechanics Data**  
Guy S. Nusholtz, Timothy P. Hsu, Manuel Alejandro Gracián Luna, Laura DiDomenico, and Sadegh Babaii Kochehseraii,  
Chrysler Group LLC

10:30-11:00 REFRESHMENT BREAK

11:00 **Rationale for and Dimensions of Impact Surfaces for Biofidelity Tests of Different Sizes of Frontal and Side Impact Dummies**  
Annette L. Irwin, General Motors Company;  
Harold J. Mertz, General Motors Corporation (retired)

11:30 **Estimating the Influence of Neckform Compliance on Brain Tissue Strain During a Helmeted Impact**  
Philippe Rousseau, T. Blaine Hoshizaki, University of Ottawa; Michael D. Gilchrist, University of Ottawa/University College Dublin;  
Andrew Post, University of Ottawa

12:00-2:00 LUNCH

## Injury Risk Assessment Based on Real-World Data

**Co-Chairs:** Dainius J. Dalmotas, D.J. Dalmotas Consulting Inc.  
Harold J. Mertz, General Motors Corporation (retired)

2:00 **Evaluation of the Field Relevance of Several Injury Risk Functions**  
Priya Prasad, Prasad Engineering, LLC; Harold J. Mertz, General Motors Corporation (retired), Dainius J. Dalmotas,  
D.J. Dalmotas Consulting Inc.; Jeffrey S. Augenstein, William Lehman Injury Research Center, University of Miami;  
Kennerly Digges, George Washington University

2:30 **Factors Associated with Abdominal Injury in Frontal, Farside, and Nearside Crashes**  
Kathleen D. Klinich, Carol A.C. Flannagan, Kristen Nicholson, Lawrence W. Schneider, and  
Jonathan D. Rupp, The University of Michigan

3:00-3:30 REFRESHMENT BREAK

3:30 **Injury Risk to Specific Body Regions of Pedestrians in Frontal Vehicle Crashes Modeled by Empirical, In-Depth Accident Data**  
Thomas Helmer and Adrian Ebner, BMW Group; Randa Radwan Samaha and  
Paul Scullion, George Washington University; Ronald Kates, REK Consulting

4:00 **Evaluation of US Rear Underride Guard Regulation for Large Trucks Using Real-World Crashes**  
Matthew L. Brumbelow and Laura Blonar, Insurance Institute for Highway Safety

4:30 ANNOUNCEMENTS

**Audio and videotaping will not be permitted. Please turn off cell phones in the meeting room.  
Smoking will not be permitted in the sessions.**

### Head and Neck Injury Biomechanics and Anthropometry

**Co-Chairs:** Barry S. Myers, Duke University  
Beth A. Winkelstein, University of Pennsylvania

- 9:00 **Lower Cervical Spine Loading in Frontal Sled Tests Using Inverse Dynamics: Potential Applications for Lower Neck Injury Criteria**  
Frank A. Pintar, Narayan Yoganandan, and Dennis J. Maiman, Department of Neurosurgery, Medical College of Wisconsin
- 9:30 **Pediatric Head Contours and Inertial Properties for ATD Design**  
Andre M. Loyd, Roger Nightingale, Cameron R. Bass, Duke University; Harold J. Mertz, General Motors Corporation (retired); Donald Frush, Clark Daniel, Calvin Lee, Jeffrey R. Marcus, Duke University; Srinivasan Mukundan, Harvard Medical School; Barry S. Myers, Duke University
- 10:00-10:30 REFRESHMENT BREAK
- 10:30 **Nerve Level Traumatic Brain Injury in *in vivo/in vitro* Experiments**  
Yasuhiro Matsui, National Traffic Safety and Environment Laboratory; Tetsuya Nishimoto, Nihon University
- 11:00 **Development of an FE Model of the Rat Head Subjected to Air Shock Loading**  
Feng Zhu, Haojie Mao, Alessandra Dal Cengio Leonardi, Christina Wagner, Clifford Chou, Xin Jin, Cynthia Bir, Pamela VandeVord, King H. Yang, Albert I. King, Wayne State University
- 11:30-1:30 LUNCH
- 1:30 **John Paul Stapp Best Paper Award** — Presentation by Frank A. Pintar, 2009 General Chair  
The John Paul Stapp Award for the best paper of the 2009 Conference and Journal will be presented to:
- Chia-Yuan Chang, Jonathan D. Rupp, Matthew P. Reed, Richard E. Hughes, and Lawrence W. Schneider for *Predicting the Effects of Muscle Activation on Knee, Thigh, and Hip Injuries in Frontal Crashes Using a Finite-Element Model with Muscle Forces from Subject Testing and Musculoskeletal Modeling*
  - Kristy B. Arbogast, Sriram Balasubramanian, Thomas Seacrist, Matthew R. Maltese, J. Felipe Garcia-España, Terrence Hopely, Eric Constans, Francisco J. Lopez-Valdes, Richard W. Kent, Hiromasa Tanji, and Kazuo Higuchi for *Comparison of Kinematic Responses of the Head and Spine for Children and Adults in Low-Speed Frontal Sled Tests*
- Invitation and Call for Papers**, John W. Melvin, 55th Stapp Conference, Hyatt Regency Dearborn, November 7-9, 2011

### Injury Biomechanics Issues in Military Environments — Oral Presentations

- 1:45 **Vehicle and Crash-Dummy Response to an Underbelly Blast Event**  
Risa Scherer, U.S. Army Research, Development and Engineering Command, U.S. Army Tank, Automotive Research, Development and Engineering Center, Warren, Michigan
- 2:15 **Gaps and Trends in Military Injury Biomechanics**  
Carol Valeta Chancey, U.S. Army Aeromedical Research Lab, Ft. Rucker, Alabama
- 2:45-3:15 REFRESHMENT BREAK

### Injury Biomechanics in Lateral Impacts

- Co-Chairs:** Rolf H. Eppinger, National Highway Traffic Safety Administration (retired)  
John M. Cavanaugh, Wayne State University
- 3:15 **Biomechanical and Injury Response to Posterolateral Loading from Torso Side Airbags**  
Jason J. Hallman, Narayan Yoganandan, and Frank A. Pintar, Department of Biomedical Engineering, Marquette University; Department of Neurosurgery, Medical College of Wisconsin; Zablocki VA Medical Center
- 3:45 **Sensitivity of the WorldSID 50<sup>th</sup> and ES-2re Thoraces to Loading Configuration**  
Xavier Trosseille, LAB PSA Peugeot Citroën Renault; Audrey Petitjean, CEESAR
- 4:15 **Whole-Body Response to Pure Lateral Impact**  
David Lessley, Greg Shaw, Daniel Parent, Carlos Arregui-Dalmases, Matthew Kindig, Patrick Riley, Sergey Purtsezov, Mark Sochor, Thomas Gochenour, James Bolton, Damien Subit, Jeff Crandall, University of Virginia Center for Applied Biomechanics; Shinichi Takayama and Koshiro Ono, Japan Automobile Research Institute; Koichi Kamiji and Tsuyoshi Yasuki, Japan Automobile Manufacturers Association, Inc.
- 4:45 ANNOUNCEMENTS



Friday, November 5

# Technical Program

In the Kierland Ballroom 3

Audio and videotaping will not be permitted. Please turn off cell phones in the meeting room.  
Smoking will not be permitted in the sessions.

## Thorax and Abdomen Biomechanics and Testing

**Co-Chairs:** Priya Prasad, Prasad Engineering, LLC  
Philippe Beillas, INRETS

- 9:00 **Structural Response of Cadaveric Ribcages under a Localized Loading: Stiffness and Kinematic Trends**  
Matthew W. Kindig, Anthony G. Lau, Jason L. Forman, and Richard W. Kent,  
University of Virginia Center for Applied Biomechanics
- 9:30 **Biomechanical Considerations for Abdominal Loading by Seat Belt Pretensioners**  
Stephen W. Rouhana, Raed E. El-Jawahri, and Tony R. Laituri, Ford Motor Company
- 10:00 **Development and Validation of Age-Dependent FE Human Models of a Mid-Sized Male Thorax**  
Raed E. El-Jawahri, Tony R. Laituri, Jesse S. Ruan, Stephen W. Rouhana, and Saeed D. Barbat, Ford Motor Company
- 10:30 **STAPP STUDENT AWARDS**  
Presentation by Dr. Stephen W. Rouhana, Ford Motor Company
- 10:45 **ADJOURNMENT**  
Lawrence W. Schneider, 2010 General Chair

# STAPP CALL FOR PAPERS

55<sup>th</sup> STAPP CAR CRASH CONFERENCE®

Hyatt Regency  
Dearborn, Michigan  
November 7-9, 2011

John W. Melvin, General Chair

## Abstract Submission Deadline – February 28, 2011

**T**he Stapp Conference Advisory Committee invites abstracts of prospective papers for consideration in planning the 55<sup>th</sup> Stapp Car Crash Conference and Journal. Papers are desired on research in impact/injury biomechanics and related fields, including analyses of real-world crash and injury data and development of injury assessment tools, that advance knowledge pertaining to human injury causation and lead to improved countermeasures for injury and fatality reduction. In addition to research and developments concerned with injuries to motor vehicle occupants and pedestrians, papers on studies dealing with sports-related injuries and injuries in military environments are welcome. Papers are also invited on crash avoidance technologies that offer potential to further enhance occupant crash protection.

**A**bstracts may be submitted at anytime and, if approved, invited papers will be reviewed throughout the year and presented at the appropriate Conference upon receiving final approval by the reviewers. Early submission of abstracts is strongly encouraged. Prospective authors will be notified within two weeks of receipt of their abstract as to whether their paper is invited for review, thereby allowing authors to submit manuscripts early. Doing so will allow more time for authors to comply with reviewer comments.

### Abstracts for paper offers must include the following:

1. a tentative title for the paper
  2. author information (name, affiliation, address, phone, fax, and e-mail)
  3. a one-page abstract **submitted as a Microsoft Word file (.doc)** that clearly
    - defines the problem that the study addresses
    - states the objective of the study
    - outlines the methodology used
    - states explicitly the data to be included in the paper, and
    - summarizes the key results and conclusions of the study
- ✓ Invitation of a paper for review is based solely on the abstract so it is important that authors provide clear, descriptive, and specific information by which the paper offer can be evaluated.
  - ✓ All papers submitted for review must include new data and results that will not have been submitted or published elsewhere prior to the Conference.
  - ✓ If a paper on a similar topic has recently been published or submitted for publication, the authors must clarify what is new in the proposed paper that warrants publication in Stapp.
  - ✓ For papers reporting on research involving human or animal subjects, a statement that the methods used have been approved by a properly constituted institutional review board (IRB) must be provided with the abstract. Abstract submissions and paper offers that do not provide this information will not be invited for review by the Stapp Advisory Committee.
  - ✓ Papers offered for consideration at the Stapp Conference and in the *Stapp Journal* must be written in an objective, scholarly, and scientific manner, and must be free of commercialism, advertisement, and product identification.
  - ✓ Papers must be prepared in clear English, and all data must be presented using SI units.
  - ✓ Papers that are judged to meet the standards and requirements of the *Stapp Journal* will be accepted for publication and presentation, and must be presented at the Conference.

### Summary of Submission Deadlines

<b>Abstract</b>	<b>February 28, 2011</b>
<b>Initial Manuscript</b>	<b>April 29, 2011</b>
<b>Final Manuscript</b>	<b>September 9, 2011</b>

**Submit Abstracts to:** Leda L. Ricci, Executive Director, Stapp Conference Advisory Committee, University of Michigan Transportation Research Institute, 2901 Baxter Road, Ann Arbor, MI 48109-2150. Authors may also submit abstracts by fax to (734) 647-3330 or by e-mail to [leda@umich.edu](mailto:leda@umich.edu). If you have questions regarding abstract or paper submission, please call (734) 936-1114.

### Technical Paper Awards

The **John Paul Stapp Award** is offered annually for the Stapp paper presented at the previous year's Conference and Journal that best meets the goals of the Stapp Car Crash Conference and *Stapp Journal* as judged by the members of the Stapp Advisory Committee.

**Stapp Student Awards** of \$1,500, \$1,000, and \$500 are presented annually to the three graduate students whose papers are judged by the Stapp Student Award Committee to have made the most significant contributions to the fields of injury biomechanics and injury reduction. Mentors of accepted papers that include significant contributions by a student are invited to describe those contributions in a letter for their student to be considered. The three awards are made at the end of the Conference in which the papers were presented.

# STAPP REGISTRATION

## 54<sup>TH</sup> STAPP CAR CRASH CONFERENCE® November 3-5, 2010

Pre-registration is available through October 29, 2010.

On-site registration is also available. See page 2 for dates, times and location.

**Mail to:** Stapp Car Crash Conference  
UMTRI, 2901 Baxter Road, Room 422, Ann Arbor, MI 48109-2150  
Fax: (734) 647-3330 (Credit card registrations only)

**For registration information:**  
Zonda Ketola — (734) 936-1114 or zketola@umich.edu

**Please attach a business card or complete the following:**

Dr./Mr./Ms. \_\_\_\_\_  
 Name (for Meeting Badge) \_\_\_\_\_  
 Job Title \_\_\_\_\_  
 Division \_\_\_\_\_  
 Company \_\_\_\_\_  
 Department \_\_\_\_\_  
 Road/P.O. Box \_\_\_\_\_  
 City \_\_\_\_\_ State (Province) \_\_\_\_\_  
 Zip+4/Postal Code \_\_\_\_\_ Country (if not USA) \_\_\_\_\_



Work Phone \_\_\_\_\_  
 Fax \_\_\_\_\_  
 E-mail Address \_\_\_\_\_

  Please check here if you require special accommodations and attach a written description of your needs.

**Hotel reservations and conference registration are also available on the Stapp website: <http://www.stapp.org/>**

CID	CLB	CL#	OB	O#
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**NOTE: You must register by October 8, 2010 to be eligible for the reduced registration rate.**

### 54<sup>th</sup> Stapp Car Crash Conference November 3-5, 2010

- Attendee
- Presenter\* (NHTSA Workshop presenters are not eligible.)
- Student\* (Registration must be accompanied by a letter from student's advisor.)
- Advisory Committee Member

Children under 18 are not permitted at conference functions. Registration includes admission to all technical sessions, continental breakfasts, refreshment breaks, evening receptions, and a copy of the Stapp Journal.

\*Student registration does not include the *Stapp Journal*.

CONFERENCE FEE	
Prior to 10/20/10	AFTER 10/20/10
\$ 700	\$ 750
\$ 600	\$ 650
\$ 200	\$ 250
\$ 450	\$ 500
<b>Total</b>	
	\$ _____

#### Payment Method\*

- Check enclosed. Make payable to "Stapp Association."
  - Charge my:  MasterCard  Visa  American Express  Discover
- Card No. \_\_\_\_\_ Exp. Date \_\_\_\_\_  
 Visa, MasterCard, Discover 3-Digit Security No. (on back of card) \_\_\_\_\_  
 American Express 4-digit Security No. (on front of card) \_\_\_\_\_

Name on credit card \_\_\_\_\_

Billing Address \_\_\_\_\_

Signature \_\_\_\_\_

\*Payment must accompany registration. All cancellations must be submitted in writing. There is a \$50.00 handling charge for cancellations received before October 8, 2010. We regret we cannot process any refunds for cancellations following that date. Refunds are processed six to eight weeks after the conference. **If you have any questions, please call (734) 936-1114.**

### 38<sup>th</sup> NHTSA-sponsored International Workshop on Human Subjects for Biomechanical Research November 2, 2010

- Check here to register. No registration fee is required.