

# Track 1: Dynamic Behavior of Materials

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Organized by:

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Welcome to Indianapolis and the 2010 SEM conference track on "Dynamic Behavior of Materials." This track represents an ever growing area of broad interest to the SEM community, as evidenced by the increased number of papers and attendance in recent years. This track was initiated in 2005 and reflects our efforts to bring together researchers interested in the dynamic response and behavior of materials, and provide a forum to facilitate technical interaction and exchange. The Sessions within this track are organized to cover the wide range of experimental research being conducted in this area by scientists from around the world. A modeling session is also included in the 2010 program. The following general technical research areas are included:

- Composite Materials
- Dynamic Failure and Fracture
- Dynamic Materials Response
- Novel Testing Techniques
- Low Impedance Materials
- Metallic Materials
- Response of Brittle Materials
- Time Dependent Materials
- High Strain Rate Testing of Biological and Soft Materials
- Shock and High Pressure Response
- Energetic Materials
- Optical Techniques for Imaging High Strain Rate Material Response
- Modeling of Dynamic Response

The contributed papers span numerous technical divisions within SEM. It is our hope that these topics will be of interest to the dynamic behavior of materials community as well as the traditional mechanics and materials community.

The organizers thank the authors, presenters, organizers and session chairs for their participation in this track. We are grateful to the TD chairs who co-sponsored and organized sessions in this track (e.g., Composite Materials, Optical Techniques for Imaging High Strain Rate Events). The SEM support staff is also acknowledged for their devoted efforts in accommodating the large number of submissions this year, resulting in the successful 2010 Dynamic Behavior program you will experience.

The track will commence on Monday morning with the following keynote presentation, and continue with a full program through Thursday afternoon. Enjoy the conference!

### Keynote Presentation:

Prof. Wayne Chen, *Purdue University*  
Dynamic Material Characterization with Kolsky Bars  
Monday, June 7, 10:30 AM, Session 1

# Track 1: Dynamic Behavior of Materials

Keynote Presentation:

**Wayne Chen**

Purdue University

## *Dynamic Material Characterization with Kolsky Bars*

Monday, June 7, 10:30 AM, Session 1

Split Hopkinson pressure bars (SHPB), also called Kolsky bars, have been widely used to determine the stress-strain response of materials in the strain-rate range  $10^2 - 10^4/s$ . Unlike quasi-static testing methods for material properties, the high-rate Kolsky bar technique does not have a closed-loop control system to monitor and adjust testing conditions on the specimen to specified levels. There are no standards to guide the experimental design either. This presentation briefly reviews the physical nature of Kolsky bar experiments and recent modifications in the attempt to conduct experiments for more accurate results. The main approach for obtaining improved results is to deform the specimen uniformly under an equilibrated stress state at a constant strain rate. As examples, the experiment design for characterizing soft materials and brittle materials will be presented in more details.



**Prof. Weinong Wayne Chen** received his Ph.D. degree (1995) from California Institute of Technology in Aeronautics and is currently a Professor of Aeronautics, Astronautics, and Materials Engineering at Purdue University, West Lafayette, Indiana, USA. His research interests are in dynamic experimental technique development and dynamic material characterization. The precision dynamic experimental methods developed in his laboratory have been transferred to numerous government, university, and industrial laboratories in US. He is a University Faculty Scholar at Purdue, a Fellow of the American Society of Mechanical Engineers, an Associate Fellow of the American Institute of Aeronautics and Astronautics, and a member of the United States National Committee on Theoretical and Applied Mechanics.