

# 2009 SEM Fall Workshop Technical Program

Advanced Image-Based Measurement Methods: Recent Developments and Applications in Engineering and Medicine

Wednesday, October 7, 2009

**8:00 AM – 9:30 AM**

## Overview of Image Correlation Principles and Software

For those that are relatively new to the use of image correlation hardware and software, an early morning session will be held from 8:00 AM to 9:30 AM at the Hilton Columbia Center Hotel. The class will focus on practical aspects of the overall process used to obtain reliable measurements, including topics such as the following;

### Imaging

- Lens selection
- Field of view
- Depth of field

### Object Pattern

- Pattern size and relation to image sampling
- Pattern application

### Lighting

- Contrast requirements
- Uniformity

### Calibration in Stereo-vision

- Target size and spacing
- Target motions
- Requirements on camera changes during calibration
- Common fields of view

### Stereo Camera Positioning

- Relative orientations
- Motions during experiments

**9:30 AM – 10:00 AM COFFEE BREAK**

**10:00 AM – 12:00 NOON**

## Advanced Topics in Image Correlation

For those that have experience in the use of image correlation hardware and software, a late morning session will be held from 10:00 AM to NOON at the Hilton Columbia Center Hotel. The class will focus on advanced topics in the use of imaging methods for reliable, accurate deformation and motion measurements in a wide range of areas. A preliminary list of topics is as follows, with additions and changes anticipated to address specific issues of interest to advanced users.

### Data recovery in case of camera movement

- Movements for which data recovery is possible

### Multi-camera pair systems and data stitching

- Principles
- Practical considerations

### Distortion corrections

- Parametric models
- Non-parametric models and applicability

### Error assessment in computer vision

- Recent developments
- Practical considerations

**12:00 NOON – 1:00 PM LUNCH,**  
*Hilton Columbia Center Hotel*

**1:00 PM – 3:30 PM**

## Advanced Digital Imaging Experiments

A series of five experiments will be performed to demonstrate how modern imaging hardware and software are used to acquire two-dimensional and three-dimensional surface deformation measurements under static and dynamic loading conditions. All experiments will take place in laboratories at the University of South Carolina. A tentative listing of experiments is given below:

- Vibration experiments for modal analysis

- Static tensile experiments and measurements in heterogeneous material for local material property characterization

- Dynamic bending experiments and measurements in heterogeneous material to characterize structural and material response

- Stereo microscope measurement for miniature specimens with distortion correction

- Characterization of three-dimensional manufacturing tool motions during material processing for optimization studies.

## Transportation

Transportation will be provided from the Hilton to USC and will return those participants who wish to the Hilton. For those participants who wish to go directly to the airport from USC for afternoon flights, direct transportation from USC to the airport will be provided by Correlated Solutions Incorporated. Departure from USC will be at 3:30 PM, with arrival at the airport at 4:00 PM.