Course 102: Digital Image Correlation
Practical considerations & guidelines towards consistent analysis and reporting
Sunday, June 7, 2015 | 10:00 a.m.–6:00 p.m.

Course Description
Digital Image Correlation (DIC) is gradually becoming a standard tool in experimental mechanics, for both industry and academia. Despite the fact that the measurement system is often sold with the argument of being easy in use and setup, a poor understanding of issues arising in the whole measurement chain (imaging, noise, correlation algorithm, smoothing, …) can result in poor or misinterpreted results.

The principal goal of this workshop is not to provide a detailed theoretical study on these. However, practical guidelines towards a consistent analysis of results and reporting in DIC will be delivered to the participants, helping them to understand more clearly the benefits and limitations of the measurement technique. All aspects will be live demonstrated and introduced step by step to guarantee an interactive course.

Having access to the spatial distribution of strains at the surface of the material via DIC enables the use of more complex test configurations to identify the mechanical behaviour of materials via the Virtual Fields Method (VFM). In a final slot of this course a live demonstration of a composite disk in compression will combine DIC and VFM yielding streamless identification of orthotropic elastic stiffness components in the MatchID DIC software. The impact of spatial resolution will be investigated for this identification process.

Who Should Attend
Practitioners of DIC at post graduate level working in both academia and industry. No specific preknowledge is required and the measurement technique is introduced step by step. Accordingly, also people that have no experience with DIC measurements can learn about what this technique can mean for their application.
Course Schedule (tentative)

10:00  Slot 1: DIC
- Basic principles of DIC: Image matching. Why is a speckle pattern needed? What is subset size and step size (what are their limitations)?
- From displacements to strains

Slot 2: Resolution and spatial resolution
- Resolution/spatial resolution: what is the meaning and relationship of these concepts and what is their role in an actual experiment
- Evaluation of spatial resolution and resolution: a brief methodology

1:00  Lunch

Slot 3: practical guidelines
- Field of view, depth of field, aperture, exposure time: how to setup a DIC experiment
- Practical considerations for speckling and lighting
- Discussion

3:30  Coffee break

Slot 4: Error sources
- Artificial strain fields due to out-of-plane motion
- Lens distortions
- Camera self-heating

Slot 5: Integrated DIC/VFM demo using MatchID (common with the VFM course)

6:00  End of Session

Course Fee
The regular fee is $400 and the student fee is $200. Course fee includes course handout material and refreshment breaks. Lodging, additional food and other materials are not included.

Cancellation Liability
If the course is cancelled for any reason, the Society for Experimental Mechanics’ liability is limited to the return of the course fees.

Instructor(s):
Prof. Pascal Lava—University of Leuven, Belgium

The workshop is led by Dr Pascal Lava from the University of Leuven, Belgium. He brings a wealth of experience in the practical application/data analysis of DIC for both local and global methodologies, and their interpretation in terms of resolution and spatial resolution.

In June 2002 Pascal Lava obtained a master degree in mathematics at Ghent University. In 2006, he acquired a PhD in sciences - nuclear physics at Ghent University. Since January 2008, he works as an associate professor at the department Metallurgy and Materials engineering (MTM) at Leuven University. His research topics include Digital Image Correlation (DIC) and material identification via virtual fields and finite element updating. Pascal Lava is author of more than 30 peer-reviewed journal papers and the founder and main developer of the DIC platform MatchID (http://www.matchidmbc.com)