

Course 102: The Grid Method for In-plane Displacement and Strain Measurement: Principle, Metrological Performance and Examples

Sunday, June 3 | 9:00 a.m.–5:00 p.m.

Course Description

The grid method is a technique suitable for in-plane displacement and strain measurement. It relies on a regular marking of the surface under investigation. The regular pattern acts as a spatial carrier, and the sought displacement components induce phase modulations of this carrier. Images of this regular marking, which progressively deforms during a test, can be advantageously processed with a spectral method. With the windowed Fourier transform, it is shown that displacement and strain components are obtained quasi-directly, which allows a fast and pixelwise determination of the displacement and strain fields.

This course aims at providing the principle of this technique, with a special emphasis on its theoretical foundation and metrological performance. Practical aspects concerning its implementation will also be discussed.

Tentative outline

- Marking surfaces with grids
- Processing grid images to extract displacement and strain fields
- Recent examples of use in mechanics of material and structures
- Metrological performance: measurement resolution, bias, spatial resolution, relationship between these quantities. Link and comparison with subset-based DIC
- Tutorial: processing various sets of grid images with Matlab programs provided to the attendees

Who Should Attend

Engineers and researchers who are seeking an alternative technique of DIC, in particular in cases for which a good compromise between spatial resolution and measurement resolution is needed.

Course Fee

The regular fee is \$500 and the student fee is \$250. 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

Dr. Michel Grédiac—*Institut Pascal*

Michel Grédiac is a professor at University Clermont Auvergne and a member of the Pascal Institute, Clermont-Ferrand, France. He graduated from the "Ecole Nationale Supérieure d'Arts et Métiers" in Paris in 1983. He received his Ph.D. in Mechanical Engineering from the "Ecole Nationale Supérieure des Mines de Saint-Etienne" and the University of Lyon in 1992. His main research interest is the development and use of full-field measurement systems for material characterization purposes. Michel Grédiac wrote more than 120 journal papers and supervised more than 25 Ph.D. students. Michel Grédiac received from the SEM the Hetényi Award in 2011, and the Lazan Award in 2015. He has been an Associate Technical Editor for *Experimental Mechanics* since 2010.



Dr. Michel Grédiac