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MS4: Advances in the Experiment-Modeling Dialog

Julien Réthoré[1], Stephen A. Hall[2], Stéphane Roux[3]

[1] GeM Institute, Ecole Centrale de Nantes,
44321 Nantes (FRANCE) (julien.rethore@ec-nantes.fr)

[2] Lund University,
Lund (SWEDEN) (stephen.hall@solid.lth.se)

[3] ENS de Cachan, 94235 Cachan (FRANCE) (stephane.roux@lmt.ens-cachan.fr)

Huge progress has been made in recent years in numerical methods dedicated to simulation of failure and crack propagation. Validation of such methods calls for quantitative comparison between the numerical modelling and experiments that reveal the complex, heterogeneous phenomena at play. Advances in 2D and 3D imaging technology plus in full-field measurements have provided mature techniques that enable the analysis of fracture at various scales, which could be used in quantitative validation of numerical simulation methods. However, the dialog between modelling and experiment is an area of development and still requires the key links to be established that can provide the best out of both domains. Examples include (but are not limited to):

- Providing a metric for comparison of results from simulation and full-field measurements, allowing for a quantitative and critical analysis of their consistency;
- Revisiting modelling parameters (geometry, loading, constitutive law, ...) based on experimental observations;
- Identifying parameters that may be difficult to access otherwise (e.g. fine description of a cohesive zone model);
- Delineating the limitations of simplified modelling (e.g. continuum damage vs. micro-cracks);
- Designing optimized experiments with appropriate discriminating/robustness compromise
- Controlling an experiment on difficult-to-measure quantities (e.g. stress intensity factors or modal mixity);
- Incorporating additional experimental observations, such as acoustic emissions or ultrasonic velocity measurements
- Including coupled phenomena, e.g., hydro-mechanical effects (both in terms of best measurement practices and simulation).

Attendees are encouraged to present their strategy and recent results in the field of fracture and failure tackled through dedicated, coupled experiments and computational modelling, for materials or structures.