Séminaire PIMM
Jeudi 09 juin 2016
Arts et Métiers ParisTech
151 bd de l'hôpital
75013 Paris
Amphi Fournel

14 h - Meriem Ghrib - Doctorante PIMM (DYSCO/LASER)
Application du choc laser pour la calibration de dommages dans des composites CFRP

Structural Health Monitoring (SHM) has been gaining importance in recent years. SHM aims at providing structures with similar functionality as the biological nervous system and it is organized into four main steps: detection, localization, assessment, and prognosis. The present work considers SHM assessment level and more particularly the estimation of the severity of delamination-type damage in Carbon Fiber Reinforced Polymer (CFRP) laminates. Prior to quantification algorithms implementation, it is critical to properly prepare the supports on which algorithms will be tested. Teflon inserts and conventional drop tower impacts are commonly used techniques in the SHM community to generate or simulate delaminations. However with such techniques it is difficult to generate controlled delamination type damage in a realistic manner. Conventional impacts do not necessarily induce uniquely delamination-type damage. Teflon inserts still remain very far from representing a realistic delamination. In the present research we investigate Laser Shock Wave Technique (LSWT), a new way to generate controlled delaminations in composites. In particular, the symmetrical laser shock approach was applied to CFRP laminates in order to generate delamination-type damage in a calibrated and realistic way. A particular attention was paid to the effect of time delay and laser beams energies on damage position and severity respectively. Post-mortem analyses were performed to characterize the induced damage. Results show a high potential of LSWT for damage calibration in both size and location.

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14 h 45 - Mathieu Leochmac – IML Lyon
Yoghurtunderstress

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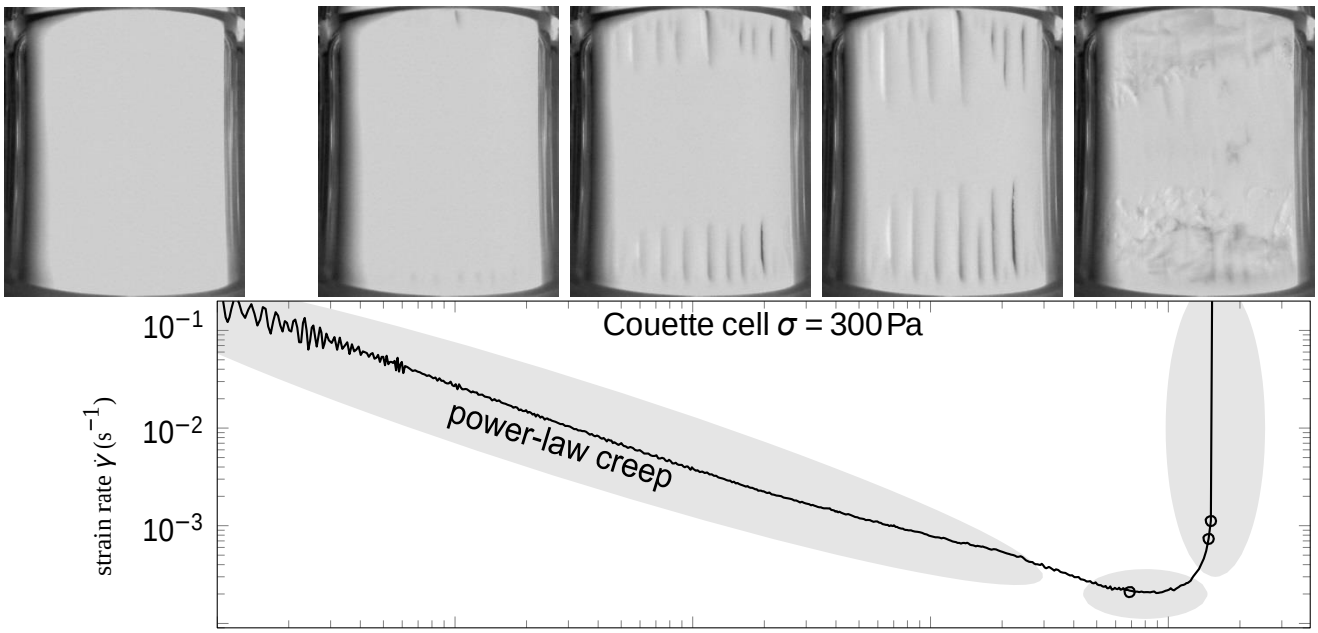
Mouthfeel is a complex, multidimensional sensory experience, whose design is criti- cal to the success of a dish or a food product. Here we investigate the mechanical be- haviour of a model yoghurt under large deformation. Biomaterials such as protein or polysaccharide gels are known to behave qualitatively as soft solids and to rupture un- der an external load. Combining optical and ultrasonic imaging to shear rheology we show [Leocmach et al., Phys. Rev. Lett., 2014, 113, 038303] that the failure scenario of an acid-induced sodium caseinate gel is reminiscent of brittle solids: after a primary creep regime characterized by a power-law behavior whose exponent is fully accounted for by linear viscoelasticity, fractures nucleate and grow logarithmically perpendicularly to shear, up to the sudden rupture of the gel. A single equation accounting for those two successive processes nicely captures the full rheological response. The failure time follows a decreasing power law with the applied shear stress, similar to the Basquin law of fatigue for solids. These results are in excellent agreement with recent fibre-bundle models that include damage accumulation on elastic fibres and exemplify protein gels as model, brittlelike soft solids.



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15 h 30 - Café