LMS Seminar

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New high strain rate mechanical tests of materials based on ultra-high speed imaging

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ABSTRACT

The recent advances in ultra-high speed imaging (1 MHz and above) opens up a new space to design mechanical tests of materials at high strain rates (100s / 1000s of s-1) based on strain and acceleration maps acquired during the elastic wave propagation regime. This is particularly interesting for brittle and quasi-brittle materials which are badly addressed by the current gold standard based on Hopkinson bars. The talk will present three test configurations that constitute the so-called 'Image-Based' test series: an inertial impact test, an ultrasonic shaking test and a wave release test that allows for simultaneous identification of low rate and high rate stiffness components on the same specimen.

BIOGRAPHY

Dr Fabrice Pierron has been Professor of Solid Mechanics at the University of Southampton since 2012, when he moved from his former professorial position at Arts et Métiers ParisTech in Châlons-en-Champagne. He is a specialist of the integration of image-based deformation mapping (like the grid method and digital image correlation) with inverse identification (like the Virtual Fields Method) to design the next generation of mechanical tests, recently christened Material Testing 2.0. He has published more than 150 journal articles and is the co-author of the first (and only!) book on the Virtual Fields Method. He was Editor-in-Chief of the journal Strain (Wiley) for ten years and is a co-founder of the company MatchID NV (Ghent, Belgium), for which he now also works as R&D Director since 2021. Prof. Pierron is Fellow of the Society for Experimental Mechanics (SEM).