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Laboratoire PMMH
10 rue Vauquelin, 75231 Paris Cedex 05



Séminaire PMMH

Salle de réunion du PMMH, Campus Jussieu, Bâtiment Cassan A, 1^{er} étage

Vendredi 13 mars 2020, 11h00-12h00

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Mechanical Properties of Fiber-Reinforced Soft Composites

In this talk I will focus on an emerging class of fiber reinforced composites where the matrix is extremely soft and tough. For example, an upper estimate for fiber/matrix modulus ratio in traditional fiber reinforced polymer composites is at most 100. Matrices made from tough elastic gels can have modulus approaching kilopascals and increase this ratio to . Our goal is to understand how this extremely high modulus ratio affects the mechanical behavior of such fiber reinforced "soft" composites (FRSCs). I will focus on unidirectional FRSCs with parallel fibers perfectly bonded to a soft elastic matrix. I show such composites exhibit the Mullins effect typically observed in rubbers and double network (DN) gels. We quantify size effect on mechanical properties by studying unidirectional composites consisting of finite length fibers. We determine the stress concentration factors (SCFs) for a cluster of fiber breaks in this geometry and show that there is a transition from equal load sharing (ELS) to local load sharing (LLS). We also determine the mean strength and work of extension assuming fibers obey Weibull statistics. We discuss the application of fracture mechanics to this emerging class of composites. We will discuss similarities between FRSCs and DN gels.

Attention : pas de séminaire la semaine prochaine.

Prochain séminaire : vendredi 27 mars 2020, Cécile Sykes (Institut Curie)

Programme des séminaires : www.pmmh.espci.fr, onglet *Séminaires PMMH*

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