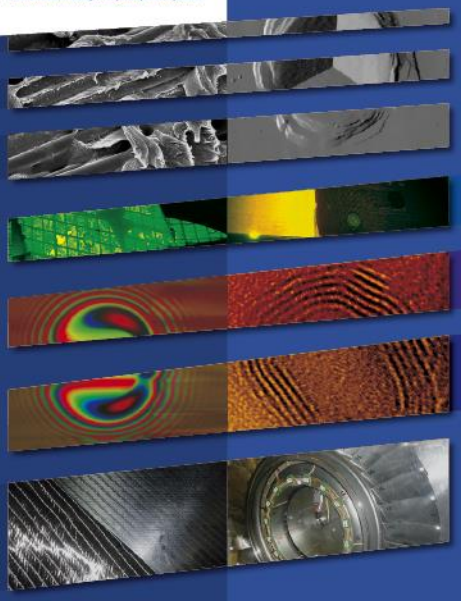

Café Scientifique

Bâtiment H10, salle B11

Jeudi 12 décembre 2013 - 13h-14h

Integrated and Distributed Adaptive Metacomposites for vibroacoustic control of Aerospace Structures

Manuel COLLET
LTDS, DFD

Research activities in smart materials and structures represent a significant potential for technological innovation in mechanics and electronics. The necessity of controlling vibroacoustic behavior of industrial systems motivates a broad research effort for introducing active or passive technologies to control noise and vibrations. New processes are now available which allow active transducers and their driving electronics to be directly integrated into otherwise passive structures. This new approach could allow fine control of the material physical behavior for implementing new functional properties that do not exist in nature. In this sense, we can speak of "integrated distributed adaptive metacomposites" that merges with the notion of programmable material or material by design. Through two different examples dealing with active acoustical impedance and elastodynamical interface, this seminar presents used theoretical tools for designing specific applications of this new technology. Experimental results are also used to validate the proposed methodologies.

Decouplage électronique d'un fullèrene vis-à-vis d'une surface d'or

Manuel COBIAN
LTDS - TPCDI

Molecular entities at the interface with an inorganic surface are the basis for new hybrid functional materials for microelectronics. In most cases, strong bonding of molecules to metal surfaces perturbs the discrete molecular energy levels leading to a broadening of the molecular density of states. Deposition of C 60 on a Au(111) surface previously exposed to tetraphenyl adamantane give rises to a nanostructured organic layer where the electronic coupling between the C60 and the Au(111) surface is significantly reduced compared to C 60 on a clean Au(111) surface (1). In this case molecular states of C60 remain more localized and less broadened, thus giving rise to strong non-linearities in the electron transport through the organic-inorganic interface. Calculations based on Density Functional Theory reveal that intermolecular interactions lock C60 into a particular orientation. Scanning tunneling spectroscopy experiments on such system exhibit the presence of negative differential resistance that motivated the simulation of the transport properties at ab-initio level using TRANSIESTA.

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