

Séminaire du laboratoire PIMM

Jeudi 30 juin 2022 à 13h30

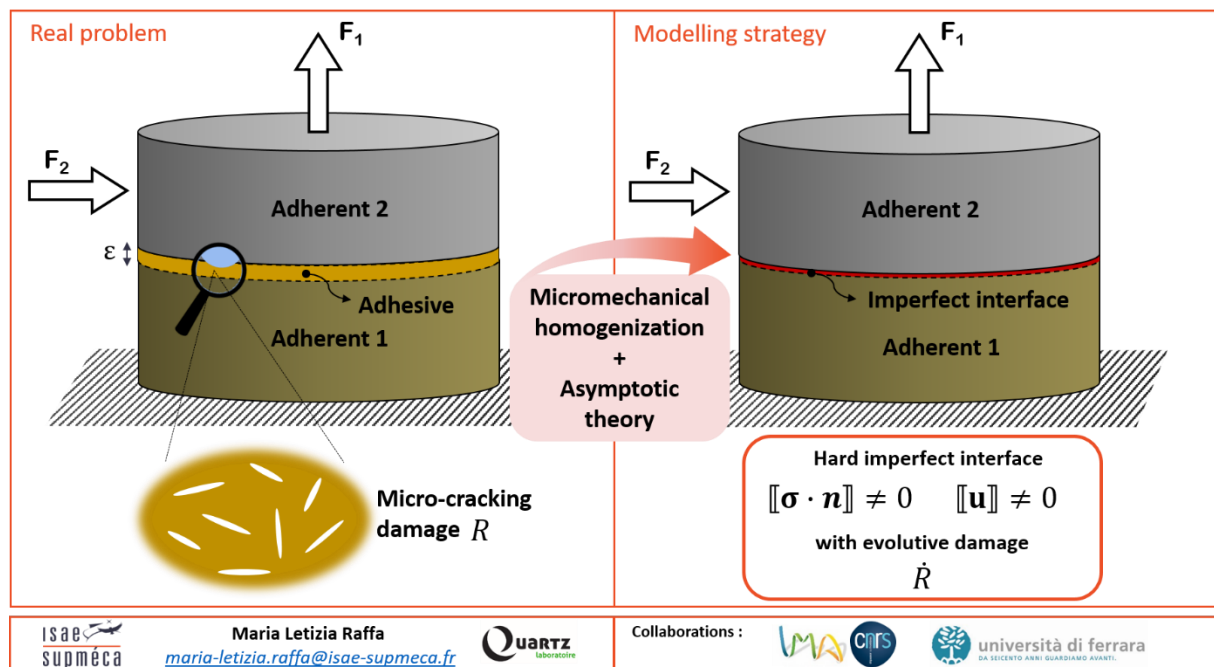
Dr. Maria Letizia RAFFA

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présentera dans le cadre du séminaire leurs travaux intitulés :

On modelling interfaces with micro-cracking damage: Application to the structural adhesives

Interphase/interface problems are by their nature multi-scale. The main goal of their study is often to reduce to the scale of the global behaviour of structures all the effects related to the microscopic and nanometric scale of the interaction zones. The scientific questions that arise are multiple and concern in particular the phenomena of adhesion, friction, damage, as well as the study of specific properties of surfaces such as roughness. The understanding of these phenomena is made particularly complex when they are located within a contact that does not allow a direct observation. This difficulty is exacerbated when dealing with problems of imperfect interfaces, i.e. when mechanical surfaces must accommodate relative displacements and forces.

The presented work proposes a simple strategy to model micro-cracked or dry-pored interphases (thin films) by obtaining imperfect interface behaviour laws. These laws represent equivalent nonlinear spring-like models, and are therefore implementable in numerical solution methods, such as the finite element method, in the framework of a multi-scale modelling. The presented method couples arguments from the asymptotic theory and techniques from micromechanical homogenization. After a brief illustration of the method we will show how it can be applied to the modelling of the mechanical behaviour of structural adhesives.



[1] Raffa, M.L., Lebon, F., Rizzoni, R. (2022) A micromechanical model of a hard interface with micro-cracking damage. International Journal of Mechanical Sciences 216, 106974. <https://doi.org/10.1016/j.ijmecsci.2021.106974>

[2] Raffa, M.L., Rizzoni, R., Lebon, F. (2021) A model of damage for brittle and ductile adhesives in glued butt joints. Technologies 9, 19. <https://doi.org/10.3390/technologies9010019>

[3] Raffa, M. L., Lebon, F., & Rizzoni, R. (2018). Derivation of a model of imperfect interface with finite strains and damage by asymptotic techniques: an application to masonry structures. Meccanica, 53(7), 1645-1660. <https://doi.org/10.1007/s11012-017-0765-3>