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A Bridge Between the Micro- and Mesomechanics of Laminates: Fantasy or Reality

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The last quarter-century has witnessed considerable research efforts in the mechanics of composites in order to understand their behavior and to model or calculate them – the ultimate goal being the design of the materials/structures/manufacturing processes. Even in the case of stratified composites (which are the most studied and, therefore, the best understood), the prediction of damage evolution up to and including final fracture remains a major challenge in the modern mechanics of composite materials and structures. One could jokingly say that there is, on the one hand, the micromechanics of laminates where one counts cracks and, on the other, the meso- or macromechanics of laminates where one measures stiffnesses – with only few links between the two. How to bridge the micro-and mesomechanics aspects and how this affects the understanding and prediction of localization and final fracture are the two main questions discussed here.

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