



## Development of tools for the study of mechanics of composite materials

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**Bio sketch:** Dr. Nicolas Carrere is expert on mechanics of composite materials in SAFRAN Tech since 2016. He has defended his PhD thesis in 2001 on the multiscale analysis of metallic composite materials. He was research engineer at ONERA until 2011. In 2008, he has defended his habilitation for research management (HDR). He moved to *Ecole Nationale des Sciences et Technique Avancées* (ENSTA) at Bretagne as the head of an industrial chair on adhesively bonded joints for renewable marine energy systems until 2016. Since then, he animates the thematic “mechanics of composite materials” at SAFRAN Tech/Composites.

**Abstract:** Safran, through its desire to improve continually its aeronautical structures, has known to catch the opportunity to develop new materials. For both metallic and composite, this search of improvement involves necessarily the investigation of high-performance materials in close relation to the needs established by the design offices. In order to attain this goal, the different societies of Safran, in the framework of the Process & Material Department of Safran group, have to develop multiscale approaches, adapted to the design office requirements, with a very strong link with academic partners. This has been possible thanks the strong involvement of Safran in Research & Development activities through different projects. A numerical multi-scale and multi-model numerical chain, at the scale of the weaving, permits to deal with Polymer Matrix Composites from the process (shaping operations, injection, curing) to the final properties (geometry, mechanical...). Some results obtained with his chain will be presented and illustrated using industrial cases.