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PREDICTION OF DAMAGES INDUCED BY A LOW-VELOCITY IMPACT ON LAST GENERATION COMPOSITE LAMINATES

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This work is dealing with an experimental and numerical study of the behavior and strength of a carbon/epoxy toughened composite material subjected to low-velocity impact [1]. A specific experimental device has been developped to monitor the evaluation of damage mechanisms during a low-velocity impact, using advanced instrumentation technologies (such as IR thermography and digital image correlation associated with superfast cameras) (Figure 1). Additionally, 3D nondestructive evaluation methods (X-ray tomography, ultrasonic scans) are considered in order to assess and understand the damage mechanisms in such a material. The tests have been simulated using a 3D FEM with contacts, a continuum damage model for the intra-ply damage (fiber failure and matrix damage) [2] and delamination modeling using cohesive elements. The impact problem is solved using an implicit solver while taking into account several sources of nonlinearities (geometrical, material and contacts). Experimental and numerical comparisons will be presented and discussed in order to evaluate the predictive capabilities of the proposed approach.

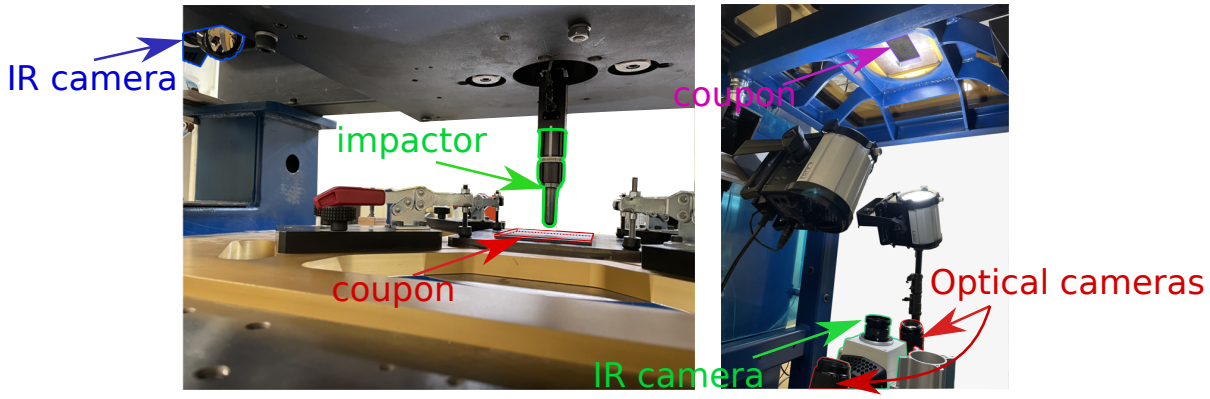

Figure 1. Impact experimental set-up

References

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