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Dynamic Response and Damage Modeling of Glass Fiber Reinforced Epoxy Composite Pipes: Numerical Investigation

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Abstract : The high mechanical performance of composite pipes can be adversely affected by their low resistance to impact loads. Loads in dynamic origin are dangerous and cause consequences on the operation of pipes because the damage is often not detected and can affect the structural integrity of composite pipes. In this work, an advanced 3-D finite element (FE) model, based on the use of intralaminar damage models was developed and used to predict damage under low-velocity impact. The performance of the numerical model is validated with the confrontation with the results of experimental tests. The results show that at low impact energy, the damage happens mainly by matrix cracking and delamination. The model capabilities to simulate the low-velocity impact events on the full-scale composite structures were proved.

Keywords : composite materials, low velocity impact, FEA, dynamic behavior, progressive damage modeling
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