APPLICATION OF CONVOLUTIONAL NEURAL NETWORKS IN THE PREDICTION OF DYNAMIC FRACTURE INITIATION OF COMPOSITE MATERIALS

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Abstract: The experimental determination of fracture toughness values at the moment of initiation is determinant for structural integrity calculations. In the dynamic regime this determination is complex, and it is observed that small differences in the determination of the initiation generate great differences in the tenacity. This study proposes an evaluation of the dynamic stress fields of composite specimens from the beginning of the impact to moments after fracture initiation. A convolutional neural network was used as an image classifier to obtain the probability of fracture occurrence. The proposed methodology exhibited satisfactory results, adequately evaluating the beginning of the fracture process.

Keywords: dynamic fracture, composite materials, fracture toughness, convolutional neural networks