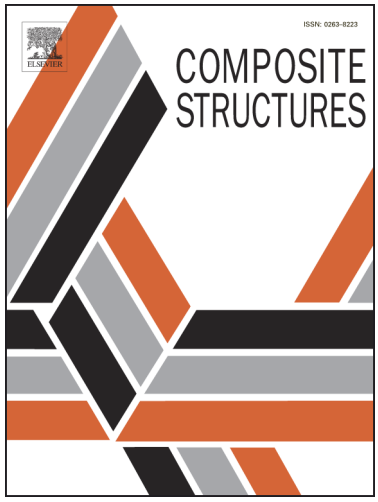

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Analytical modeling of low velocity large mass impact on composite plate including damage evolution

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Abstract

An improved analytical model to predict the response of composite laminate under low velocity large mass impact is proposed. A spring-mass system is used to represent the contact, bending, shear and membrane stiffnesses of the laminate system. The stiffness of the springs is evaluated by dividing the laminate into a central damaged region with degraded stiffness surrounded by an undamaged region. The stiffness of the springs changes as the damage region grows with time. The predictions of the force between impactor and laminated and size of the damaged region from the model are compared with the finite element (FE) simulation results and available experimental results in the literature for CFRP laminates. The comparison demonstrates a good prediction capability of the proposed formulation. The damage radius predicted by the analytical model is also checked and found good match with FE simulation results.

Keywords– low velocity impact, analytical model, progressive damage analysis, large mass impact behavior

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