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ABSTRACT:

Composite Structures Design of Sailboats and Aeronautic Structures

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Composite materials and sandwich structures are widely used in shipbuilding and aeronautical design. The composite materials used are laminates and sandwich structures with Nomex [1] cores or carbon/epoxy structure with three-dimensional architecture. The validation of Nomex cores for combined out-of-plane compression/shear loading requires the development of tests and associated finite element models. A failure criterion for quasi-static out-of-plane compression/shear loading is proposed based on numerical simulations of Nomex VER instability modes. Concerning the behaviour of laminated composite skins, damage can be assessed using non-local damage models at the meso-scopical scale. Finally, the validation of composite materials with respect to fatigue loading remains a primary objective for the durability of nautical and aeronautical structures. Consequently, the fatigue limits of composite materials are determined using the self-heating method. This method, widely used for metals, has been validated for carbon/epoxy composite materials [2-3]. Finally this method is used to determine the fatigue limits of laminates with initial impact damage [5].

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[3] L Muller, JM Roche, A Hurmane, FH Leroy, C Peyrac, L Gornet, Investigation of self-heating and damage progression in woven carbon fibre composite materials, following the fibres direction, under static and cyclic loading
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