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Numerical Prediction of Bearing Strength on Composite Bolted Joint Using Three Dimensional Puck Failure Criteria

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Abstract : Mechanical fasteners especially bolting is commonly used in joining carbon-fiber reinforced polymer (CFRP) composite structures due to their good joinability and easy for maintenance characteristics. Since this approach involves with notching, a proper progressive damage model (PDM) need to be implemented and verified to capture existence of damages in the structure. A three dimensional (3D) failure criteria of Puck is established to predict the ultimate bearing failure of such joint. The failure criteria incorporated with degradation scheme are coded based on user subroutine executed in Abaqus. Single lap joint (SLJ) of composite bolted joint is used as target configuration. The results revealed that the PDM adopted here could sufficiently predict the behaviour of composite bolted joint up to ultimate bearing failure. In addition, mesh refinement near holes increased the accuracy of predicted strength as well as computational effort.

Keywords : bearing strength, bolted joint, degradation scheme, progressive damage model
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