

## Strain Based Failure Criterion for Composite Notched Laminates

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**Abstract :** A strain-based failure criterion for composite notched laminates is introduced where the most critical stress concentration factor for the anisotropic notched laminates could be related to the failure of the corresponding quasi-isotropic laminate and the anisotropy ratio of the laminate. The proposed criterion will simplify the design of composites to meet notched failure requirements by eliminating the need for the detailed specifications of the stacking sequence at the preliminary design stage. The designer will be able to design based on the stiffness of the laminate, then at a later stage, select an appropriate stacking sequence to meet the stiffness requirements. The failure strains for the notched laminates are computed using the material's Omni-strain envelope. The concept of Omni-strain envelope concerns the region of average strain where the laminate is safe regardless of ply orientation. In this work, we use Hashin's failure criteria and the strains around the hole are computed using Savin's analytic solution. A progressive damage analysis study has been conducted where the failure loads for the notched laminates are computed using finite element analysis. The failure strains are computed and used to estimate the concentration factor. It is found that the correlation found using Savin's analytic solution predicts the same ratio of concentration factors between anisotropic and quasi-isotropic laminates as the more expensive progressive failure analysis.

**Keywords :** anisotropy ratio, failure criteria, notched laminates, Omni-strain envelope, savin's solution

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