

Computer Analysis for Relationship between Applied Shear Stress and Compressive Strength of Composite Materials Using Computer Simulation

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ABSTRACT

This study investigates computer analysis for relationship between applied shear stress and compressive strength of composite materials using computer simulation. For this purpose, firstly computer simulation of compressive failure of composite materials is conducted. Simulated results show that when compressive failure initiates in the material, matrix causes large shear deformation due to nonlinear stress-strain relation of matrix, and the initiation of compressive failure of the material is closely related with the nonlinear stress-strain relation of matrix. When the shear stress is applied to the material, yield behavior of matrix is affected by the applied shear stress, and the initiation of failure of the material also changes, consequently the compressive strength of the material changes. The numerical results show that when the applied shear stress increases, the compressive strength of composite materials decreases, and this relation is close to the linear relation. The numerical results are also compared with the experimental results, and correspondence is found in between numerical and experimental results. Then the relationship between applied shear stress and compressive strength is analyzed from the mathematical equation expressing initiation of compressive failure of the material. As the results of the analysis, when the applied shear stress increases, yielding of matrix occurs at early stage, and then nonlinearity appears in the stress-strain relation of composite material, and the compressive strength of the material reduces. The analysis results of the relationship between applied shear stress and compressive strength agree with the above numerical results and experimental results.

Keywords: Computer analysis, compressive strength, composite materials, computer aided engineering
