



Structural Analysis of Composite Wind Turbine Blades

By Dimitris I Chortis

Springer Jul 2013, 2013. Buch. Book Condition: Neu. 235x155x19 mm. Neuware - This book concerns the development of novel finite elements for the structural analysis of composite beams and blades. The introduction of material damping is also an important aspect of composite structures and it is presented here in terms of their static and dynamic behavior. The book thoroughly presents a new shear beam finite element, which entails new blade section mechanics, capable of predicting structural blade coupling due to composite coupling and/or internal section geometry. Theoretical background is further expanded towards the inclusion of nonlinear structural blade models and damping mechanics for composite structures. The models effectively include geometrically nonlinear terms due to large displacements and rotations, improve the modeling accuracy of very large flexible blades, and enable the modeling of rotational stiffening and buckling, as well as, nonlinear structural coupling. Validation simulations on specimen level study the geometric nonlinearities effect on the modal frequencies and damping values of composite strips of various angle-ply laminations under either tensile or buckling loading. A series of correlation cases between numerical predictions and experimental measurements give credence to the developed nonlinear beam finite element models and underline the essential role of new...



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