Fatigue Analysis of an Optimized HAWT Composite Blade

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Abstract

This work studies the fatigue behavior of an optimized composite wind turbine blade of a previous research. It employs methodologies using classical theory, as well as probabilistic and numerical techniques for the study of the blade. Modal Analysis showed that the blade is safe from resonance phenomenon. Fatigue analysis showed that the service lifetime of the blade until failure is about 17 years for the turbine operating speed of 36 rpm, and about 15.8 years for the operating speed of 47 rpm, which are less than the expected life of 20 years by 14.7% and 20.9% respectively

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