Spatial reliability analysis of a wind turbine blade cross section subjected to multi-axial extreme loading

This paper presents a methodology for structural reliability analysis of wind turbine blades. The study introduces several novel elements by taking into account loading direction using a multiaxial probabilistic load model, considering random material strength, spatial correlation between material properties, progressive material failure, and system reliability effects. An example analysis of reliability against material failure is demonstrated for a blade cross section. Based on the study we discuss the implications of using a system reliability approach, the effect of spatial correlation length, type of material degradation algorithm, and reliability methods on the system failure probability, as well as the main factors that have an influence on the reliability. (C) 2017 Elsevier Ltd. All rights reserved.

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