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FATIGUE CASE STUDY AND RELIABILITY ANALYSES FOR WIND TURBINES*

Herbert J. Sutherland
and
Paul S. Veers

Wind Energy Technology

Sandia National Laboratories

Albuquerque, NM 87185-0708

ABSTRACT

Modern wind turbines are fatigue critical machines used to produce electrical power. Economic viability requires them to have both low initial cost and long term reliability. The fatigue and reliability projects in Sandia's Wind Energy Program are developing the analysis tools required to accomplish these design requirements. The first section of the paper formulates the fatigue analysis of a wind turbine using a cumulative damage technique. The second section uses reliability analysis for quantifying the uncertainties and the inherent randomness associated with turbine performance and the prediction of service lifetimes. Both research areas are highlighted with typical results.

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