Integrated dynamic testing and analysis approach for model validation of an innovative wind turbine blade design

DTU Wind Energy continues the experimental investigation of the wind turbine blades to assess innovative designs of long and slender blades. This paper presents an experimental structural dynamics identification and structural model validation of the 14.3m long research blade. Unique feature of the blades is that its internal layup design has been highly optimized w.r.t. stretching the rotor and substantial mass reduction at the same time. As the result, the blade is more flexible than the traditional one. The results of the modal tests following analyses were performed: (i) Uncertainty Quantification of the experimental modal parameters for the blades, (ii) non-linearity assessment, (iii) numerical model correlation – frequencies and mode shapes of the experimental model comparison with those from Finite Element (FE). Finally, the outlook for the future experimental blade research activity is outlined.

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