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Site Suitability Assessment with Dynamic Wake Meandering Model. A Certification Point of View.

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Establishment of large wind farms requires enormous investments putting steadily greater emphasis on optimal topology design and control of these. This requires not only an optimization of the power output, but also the development of strategies to cope with the higher loading expected.
The cornerstone of such strategies is a realistic characterization and modelling of the wake flow field inside the wind farm, beyond Frandsen's equivalent turbulence method. Whereas Frandsen model has been mostly considered in the industry so far, it has not proved completely satisfactory when facing current problems such as wake effects on turbines placed at short distances or consequences of half wake for turbine loading.
The objective of the present work is to address these questions from a certification point of view within the framework of Risoe's Dynamic Wake Meandering (DWM) model. The DWM model is based on the combination of three parts: modeling of quasi-steady wake deficits, a stochastic model of the downwind wake meandering and an added or self-generated wake turbulence.
The analysis carried out is two-fold: First, a comparative study of the wake effects generated in Frandsen model as well as in various realizations of the DWM model is performed. For this purpose wake-induced loads are calculated using two different aeroelastic codes: HAWC2 and Bladed. Second, the applicability of DWM for the assessment of wind turbines under site-specific conditions is discussed and the conclusions summarized in a Recommended Practice.
Clear prescriptions are thereby provided for the use of DWMM for site suitability assessments, including the aforementioned extreme situations, along with the interpretation of the future version of the IEC 61400-1 standards.