Demonstration of partial pitch 2-bladed wind turbine - DTU Orbit (18/08/2019)

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This is the final report for the EUDP project performed from January 2012 to December 2015. The main objective for the project was to demonstrate the potential of the partial pitch two-bladed (PP-2B) technology. DTU Wind Energy took a responsibility for three workpackages (WPs) among 6 WPs which were aerodynamic evaluation of partial pitch technology (WP2), aeroelastic analysis of two-bladed turbine (WP3) and On-site testing (WP4). For the WP2, a comprehensive set of 3D CFD simulations including the gap between inner and outer part of the blade and vortex generators (VGs) of both cross-sections on the blade as well as fully resolved rotor simulations, and finally simulations coupling HAWC2 with EllipSys3D, investigating the behaviors of the rotor at standstill, has been performed. For the WP3, the state-of-the art aeroelastic analysis tool, HAWC2, has been updated in order to consider the partial pitch concept and detailed load analyses were performed. Also the comparison studies between numerical results and experimental results were performed. Moreover stability analyses for the PP-2B turbine have been performed with HAWC2 and modal analysis using Hill’s method was performed to calculate the mode shapes and modal frequencies. For the WP4, the onsite measurements were successfully carried out at Harboøre Tange, Thyborøn, Denmark in the period 28th September 2012 to 14th of January 2016. The structural loads, produced power and turbine controller signals were measured and sampled together with detailed inflow information from the met mast nearby.

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