Cyclic pitch for the control of wind turbine noise amplitude modulation - DTU Orbit (04/11/2019)

Cyclic pitch for the control of wind turbine noise amplitude modulation

Using experimental data acquired during a wind turbine measurement campaign, it is shown that amplitude modulation of aerodynamic noise can be generated by the rotating blades in conjunction with the atmospheric wind shear. As an attempt to alleviate this phenomenon, a control strategy is designed in form of a cyclic pitch of the blades. As a side effect, it is shown that it is also possible to reduce fatigue load on the blade using this cyclic pitch. The main goal is to reduce both amplitude modulation and fatigue load without compromising the energy harvested from the wind. A simulation tool that can model the different aerodynamic and aeroacoustic aspects of the study is presented. Parameters controlling the cyclic pitch are optimized in order to reduce amplitude modulation and/or fatigue load to a minimum. It is shown that such a minimum can be found and that benefit may be achieved if such a strategy is to be implemented on an actual wind turbine, though at the expense of an increased wear and tear of the pitch control system.

General information
Publication status: Published
Organisations: Department of Wind Energy, Aeroelastic Design
Contributors: Bertagnolio, F., Aagaard Madsen, H., Fischer, A., Bak, C.
Number of pages: 8
Publication date: 2014

Host publication information
Title of host publication: Proceedings of Inter-noise 2014
Keywords: Sound radiation, Microphone arrays, Spherical arrays, Acoustic holography
Electronic versions:
Cyclic_pitch_for_the_control.pdf