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A Long-Period Grating Sensor for Wind Turbine Blades

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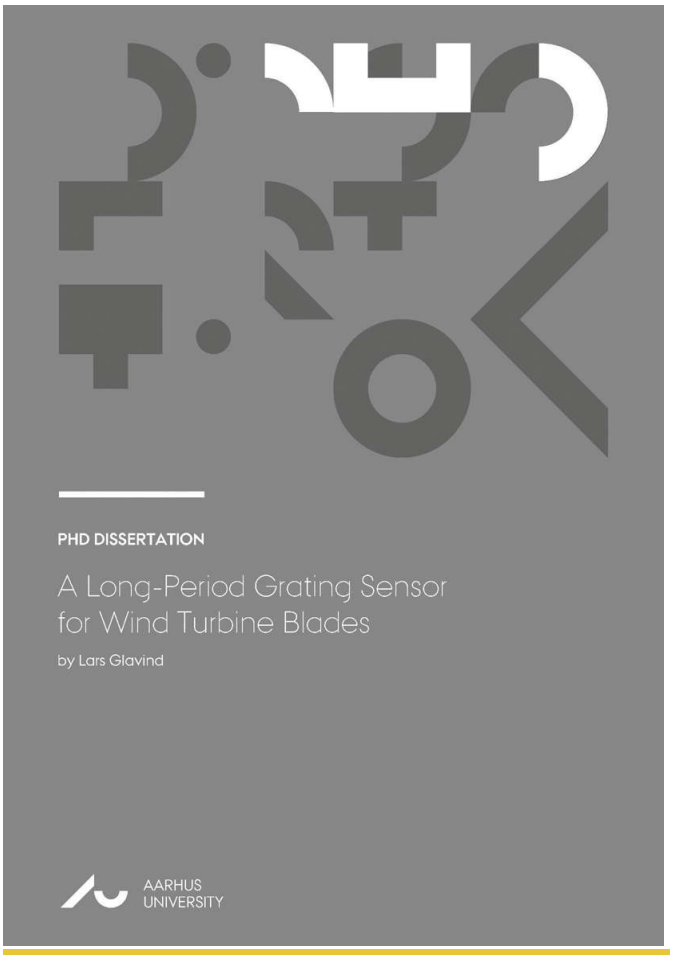
This PhD project concerns the applied research for providing a novel sensor for measurements on wind turbine blades, based on Long-Period Gratings. The idea is based on the utilization of a special asymmetrical optical fibre with Long-Period Gratings for directional sensitive bend sensing. The project involves the processes from feasibility study of fibre grating technology to full scale test on a wind turbine blade. The project has involved the design and manufacturing of a D-shape optical fibre. The project includes the process of embedding the optical fibre directly into the wind turbine blade material, where a suitable process and recoating material were investigated. The sensor was implemented and tested on a full scale wind turbine blade placed on a test rig. This first prototype has demonstrated the capability of the sensor for wind turbine blade monitoring, particular the possibility to distinguish between the flap- and edge-wise bend directions on the wind turbine blade, providing a selective sensor. The sensor has proven to be very robust and suitable for this application.



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