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Incorporating Structural Health Monitoring in the Design of Slip Formed Concrete Wind Turbine Towers

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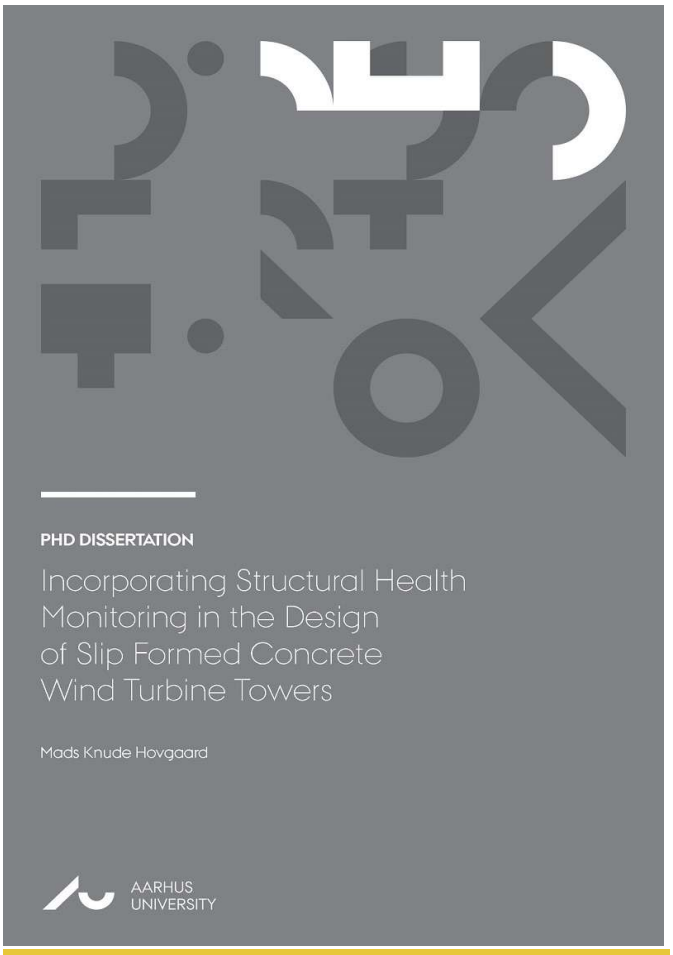
During his studies, Mads Knude Hovgaard researched methods of statistically detecting damage in large civil structures by monitoring their vibrations. Deterioration mechanisms such as fatigue and corrosion increase the probability of failure for a civil structure during its lifetime. To reduce the risk, current practice is to perform scheduled maintenance, at the expense of increased costs. By applying statistical decision analysis for planning of maintenance actions and for the initial structural design, the author studied how information of the structure's vibrations can be translated into life-cycle costs of the civil structure and then validated the theory numerically, for a wind turbine tower, and experimentally, for a scaled structure. The findings enable researchers in the field of Structural Health Monitoring (SHM) to evaluate the economic benefit of a technology on a common platform. By disproving that SHM inherently is valuable, and by facilitating intuitive cost-benefit analysis, the findings bridge the gap between the research-based discipline of SHM and the demands of real world decision-makers.



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