Structural Dynamics and Acoustic Systems Laboratory
University of Massachusetts Lowell
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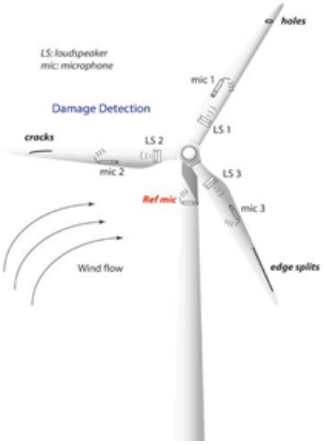
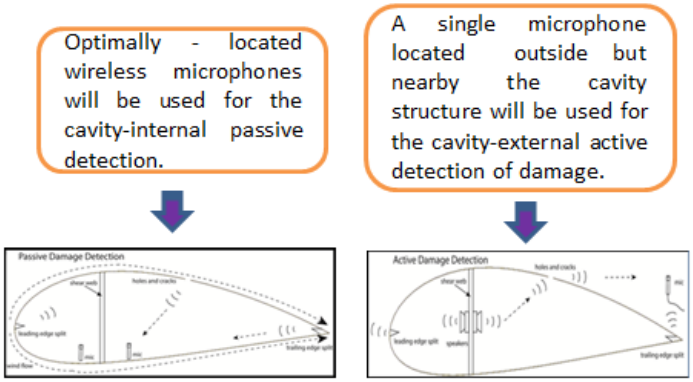
PHD DISSERTATION – RUKIYE CANTURK

Development of a Novel Acoustic-Sensing Based SHM Technique for Wind Turbine Blades





Modern wind turbine blades consist of composite airfoil shaped structures that form a hollow acoustic cavity. Because of continually varying aerodynamic forces, gravitational loads, lightning strikes, and weather conditions, all blades will experience leading and trailing edge splits, cracks, or holes that are currently not detectable except by visual inspection or post blade failure. Proposed research will examine the use of wireless sensing approach from distributed points for detecting defects of wind turbine blades, while they are rotating in operation. Subscale wind turbine will be used for purpose of damage detection, identification and localization of the blades. Experimental measurements, computational modeling and analytical approaches to predict failures of wind turbine blades will be integrated. In order to handle an of the drawback of wireless sensing technique in terms of energy supply, distributed algorithms for wireless sensing network will be developed.

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