



## **Acoustics in Structural Health Monitoring - A View on its Role and Resulting Potentials**

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Structural health monitoring (SHM) can be briefly defined as the integration of sensor and possibly also actuator functions into materials and structures which allow diagnostics and possibly also prognostics to be performed in terms of non-destructive testing and residual life assessment. So far acoustics in SHM has been mainly used for damage detection only looking at techniques such as acoustic emission or acousto-ultrasonics, where the latter has been very much associated with guided waves. Some of the work also deals with non-linear acoustics allowing damages to be detected at even smaller scales. Sensors to be used mainly include piezoelectrics and optical fibres. With these types of sensors and/or transducers in general sensing systems have been gradually developed and ruggedized. Those systems nowadays can claim to be used in real in-service applications. However this has still not sufficiently exhausted the options acoustics can provide. Fields being tackled to a much lesser extent include the use of electro-magnetic transduction (EMAT) or the use of acoustics for stress measurement. Exotic applications will also be addressed such as the application of acoustics for monitoring concrete structures. The presentation will first look into some conventional acoustics based SHM solutions such as applied in the wind energy sector before discussing more unconventional solutions such as EMAT based pure guided wave monitoring or stress measurement options in reinforced concrete structures.