UWB Channel Modeling for Wind Turbine Blade Deflection Estimation

Author(s) - Institution(s):
Morten, Jakobsen, AAL

Corresponding author email: mlj@es.aau.dk

Corresponding WG group: WG1

Abstract:

In this contribution we use UWB signals for deflection estimation on wind turbine blades. Our approach is to acquire two separate distances to each blade tip via time-delay estimation, and each tip is then localized by (constrained) triangulation. We have derived anapproximate maximum a posteriori (MAP) delay estimator exploiting i)contextual prior information and ii) a direct-path approximation in the underlying channel model. The resulting deflection estimation algorithm is computationally feasible for online usage and is able to outperform a similar algorithm employing instead a standard correlator for the underlying time-delay estimation. Current investigations and open issues go in the direction of a more appropriate channel model taking multipath interference into account (instead of simply ignoring it). A key issue is to be able to calculate/estimate the instantaneous SNR or some other appropriate measure of instantaneous reliability of the blade tip range estimates.