

A strategy for reliability-based multidisciplinary design optimization of wind turbine using BLISS and PMA

ABSTRACT

Performance of wind turbines can be negatively affected by uncertainties. Uncertainty-based multi-disciplinary design optimization (UMDO) techniques have been successfully applied in the aerospace industry and given the similarities to wind turbine design problem, application of UMDO techniques is an opportunity to improve wind turbine design. However, the major challenges of UMDO, namely computational complexity and organizational complexity caused by both time-consuming disciplinary analysis models and UMDO algorithms, still greatly hamper its usage in wind engineering. In recent years, there is a surge of research aiming at solving these problems. The purpose of this paper is to review these approaches and with the gathered information, a strategy with bi-level integrated system synthesis (BLISS) and performance measurement approach (PMA) for a reliability-based multidisciplinary design optimization of a wind turbine is proposed.

Keyword: Bi-level integrated system synthesis; Performance measurement approach; Sequential optimization and reliability evaluation; Uncertainty-based multi-disciplinary design optimization