

STRUCTURAL DESIGN OPTIMISATION FOR WIND TURBINE TOWERS USING ADVANCED FEM MODELS

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ABSTRACT

In the present paper, the structural behaviour of typical steel tubular wind turbine towers under wind loads are simulated and analysed. In particular, towers of heights of 50m, 150m and 250m are considered and numerically investigated with three different design approaches being the following: (i) the support tower appropriately designed with internal horizontal stiffening rings, (ii) the tower without stiffening rings and (iii) thin tower with strong stiffening rings. As the steel structure's weight is directly related to the project's cost, weight reduction ratios are compared to the displacement and stress increase ratios in order to estimate the optimal tower design by reducing the cost meeting and satisfying stiffness and strength Structural Codes requirements.