Control Strategy for Floating Offshore Wind Turbines based on Optimization Algorithms

Seydali Ferahtia*, Mohammed Machmoun¹, Mourad Ait-Ahmed¹, Azzedine Houri¹, and Abdelhakim Saim¹

¹Institut de Recherche en Energie Electrique de Nantes Atlantique UR 4642 – Institut Universitaire de Technologie - La Roche-sur-Yon, Nantes Université - Institut Universitaire de Technologie Saint-Nazaire, Nantes Université - Ecole Polytechnique de l’Université de Nantes – France

Résumé

The wind industry’s shift towards deep-sea operations has increased interest in floating offshore wind turbines (FOWTs). These floating platforms introduce greater motion, potentially reducing power production and increasing structural stress. To address this, new control strategies are needed. The commonly used gain-scheduled proportional-integral (GSPI) controller adjusts blade pitch above rated wind speeds but relies on mathematical approximations. A study presents an improved GSPI controller (OGSPI) using the meta-heuristic optimizer algorithms that find the best set of control parameters for the classical GSPI that reduce platform motion while maintaining power output. The performance of the OGSPI relies on the used data and the considered platform.