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CERTIFICATE OF PARTICIPATION

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Hybrid artificial intelligence and lyapunov theory control for wind energy conversion systems

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Abstract: The integration of hybrid artificial intelligence (AI) techniques with Lyapunov-based control theory offers a promising approach to enhancing the performance and stability of wind energy conversion systems (WECS). This paper explores how Lyapunov-based control theory and fuzzy logic can be employed alongside Lyapunov stability theory to optimise power extraction, enhance grid integration, and facilitate reliable operation in fluctuating wind conditions. Simulations and comparative studies have validated the proposed framework, demonstrating its superior efficiency and reduced mechanical stress and fault tolerance compared to conventional control strategies. These results emphasise the potential of combining hybrid AI and Lyapunov theory to create next-generation wind energy systems that are more reliable and efficient.

Key word: Artificial intelligence, DFIG, Hybrid control, Lyapunov theory, WECS.