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Research on the Application of Wind Farm connected to the Grid in Weak Grid Condition

Wei Tian

**Department Manager, NARI Technology Development Co .Ltd
Nanjing, China**

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Abstract

This paper studies the harmonic control problems of wind farm connected to the grid in weak grid condition, due to uneven distribution grid load, unreasonable grid structure, high voltage harmonics, voltage unbalance, frequency instability in the weak grid, and full power wind power converter itself is a harmonic source, the interaction between the grid impedance and the output impedance of the inverter will produce resonance, in which cause harmonic pollution to the power grid, and affect the stability of wind farm. According to the problem of the abnormal situation in the grid, wind farms can still remain the grid-connected operation as conventional power plants, and provide adequate support for the grid, this paper studies LCL filter design and the grid-side converter internal model control strategy under unbalanced grid voltage and the harmonic condition, the double loop control system based on embedded internal model control and PI control is proposed, accurate tracking and disturbance rejection of harmonic signals have been realized. The simulation and experiment results indicated the effectiveness and feasibility of the proposed control method in this paper.