

Voltage non-sinusoidality evaluation on WPP busbar taking into account the shunt effect of WPP collector network.

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Currently, projects for the power output scheme of wind power plants operating in parallel with the Russian power system are being implemented. The highest installed capacity of wind power plants is observed in the Unified Energy System of the South.

To ensure voltage frequency indicators of 50 ± 0.2 Hz at the station's busbars, each wind power plant includes inverter installations (the number of installations corresponds to the number of wind turbines), each of which is rated for the full capacity of its generator. Being the sources of higher harmonic currents, these inverters degrade the power quality in terms of voltage waveform distortion.

During the design of the station, as part of the development of working and project documentation, one of the mandatory procedures is the assessment of power quality indicators. The complexity of this assessment, specifically regarding voltage waveform distortion, at the preliminary stage of power output scheme development, may be due to the absence of parameters for the collector network.

This article takes into account the shunting effect of the 35 kV wind power plant collector cable network due to the physically induced presence of significant capacitance between the collector network and the ground. It is shown that as the harmonic order increases, the shunting effect intensifies. A near-resonant growth of the higher harmonics currents at the point of common connection of the wind farm and the power system has been revealed.

Key words. wind farm, DC-AC convertor, collector network, power output scheme, power quality, non-sinusoidal, harmonics, EMTP.