

The Appraisal of Voltage Unsinusoidality in the Electrical Distribution Network

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Voltage unsinusoidality is a type of conductive barriers for electromagnetic compatibility (EMC). EMC indicators must have physical content, be applied to interference of any kind, ensure the unity of standardization, measurement and calculation. Conceptual principle is EMC assessment by simulating interference with electrical equipment.

EMC models should be simple, but at the same time reflect the basic properties of objects. Negative effects from the influence always depend on the capacity of reaction and inertia of the object. So the easiest power unit should have square-law generator and inertial link of the first rank. The appraisal of EMC will be wrong without a simulation.

The best result of the appraisal of voltage unsinusoidality is obtained if the sine wave will be devoted not into entire range, but cyclically. In this case, the schedule of obstacles is nonzero solution within those cycles where there are distortions. Sinusoids' options in each cycle may be different. Another of the calculation methods used in practice is the representation of non-periodic processes in the form of a Fourier series on a finite interval. The formulas for the coefficients of the Fourier series suggest the periodic process, including the equality of ordinates at the beginning and at the end of the cycle. In the case of non-periodic interference, these ordinates may not be the same, leading to errors in the sine wave phase definition.

1. I.V. Zhezhelenko, *The Upper Harmonic in the Electric Power Systems* (M.: Energoatom pub.: 2004).
2. Y.S. Zhelezko, *The Losses of Electricity. Reactive Capacity. Quality of Electricity. Almost guidance for calculations* (M.: ANAS pub.: 2009).
3. A. Cusco, M. Thompson, *The Quality of Energy in Electric Webs* Trans. from English. (Moscow: Dodeka - HH1: 2008).