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Evaluation of lightning-resistant samples of composite heavy-duty blades of wind generators.

Composite materials are increasingly used in power engineering, in particular, in manufacturing of wind turbine blades. The blades and towers of wind generators are subject to the destructive effect of thunderbolts, so the urgent problem is the improving of their lightning protection. To simulate and perform tests of the lightning current distribution along the blade, the wave shape similar to the real one should be used. Experiments show that the effect of the real lightning current significantly differs from the effects of the standardized pulses of lightning current. In addition, obtaining a reliable model of the effect of lightning current requires taking into account the dynamic resistance of the grounding device. The mechanical effect of the lightning current pulse is relatively short. The properties of composite materials under exposure times of few to dozens of microseconds have little been studied. Therefore, the development of new approaches to measuring the characteristics of composite materials under short-term effects considered in the article, is relevant. The schemes and parameters of the pulse current generators, reproducing lightning currents close to the real ones when that act on the parts of the carbon fiber blades of wind generators are presented in this paper. Experimental and simulated lightning current curves are also presented.

The scheme and the parameters of the generator pulse currents, simulating actual flowing currents on wind turbine blades are presented. The form and duration of these pulses are considerably different from the standard.

Keywords: pulse generator, wind turbine, lightning resistance, composite materials.

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