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Partial Discharge under PWM stress-type Conditions

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In recent years, the increasing use of AC-DC converters, especially in the field of renewable energy sources, has led to the implementation of new modulation techniques, in particular the ones based on the pulse width modulation, PWM. The purpose of the present work is to evaluate the presence of partial discharges that occur when the supply is a PWM stress-type. In particular the goal is to validate a previous work in which the measurements of partial discharges has already done [1]. The aim is to carry out further measurements in order to confirm that the measurement set-up for testing IGBT modules, is able to distinguish the pulses due to the dv/dt , present in the PWM trend, and the partial discharges.

The setup used for the realization of the corona discharges is constituted by an electrode section $30\ \mu\text{m}$, which was powered with a PWM waveform, and a counter electrode placed at a distance of 2.8 cm consisting of a copper plate and connected to the ground terminal. The power supply of the sample is carried out through a power cable connected to the amplifier voltage. The measurement is made by means of a field probe.

By feeding the system with the PWM waveform, additional pulses are due to a dv/dt of rise time and fall time of the carried signal. Increasing the voltage of the PWM waveform it is possible to note the triggering of the corona partial discharges.

Analyzing the discharge pulse, it is possible to distinguish partial discharges from other type of discharges. In this way it is made clearer the measurement of partial discharges when the PWM type source is used. It is then confirmed that the pattern carried out in a previous work represent a real partial discharges.

[1] P. Romano, F. Viola, R. Miceli, C. Spataro, B. D'Agostino, A. Imburgia, D. La Cascia and M. Pinto, "Partial Discharges on IGBT Modules: are Sinusoidal Waveforms Sufficient to Evaluate Behavior?", IEEE CEIDP Conf. Electr. Insul. Dielectr. Phenomena, pp. 224-227, 2014.

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