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Title :
Novel Algorithms of Identifying Types of Partial Discharges using Electrical and Non-Contact Methods

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Identifying types of Partial Discharge (PD) is very crucial in order to prepare and provide solutions before complete breakdown occurs. Before PD can be identified, detection of the PD is initially required and it can be made by ultrasonic and electrical methods. By using ultrasonic methods, the obtained PD data is conventionally identified using Neural Network (NN) models where it has several disadvantages. It can be said that NN suffer from several drawbacks such as black-box behaviour, inconsistencies in producing results, initialization issues and complex parameter setup. Similarly, electrical method, where PD is identified using PD circuit detectors, sensors and amplification circuits also presents drawbacks such as inconvenient system configuration as well as complex set up. Two novel algorithms are presented in this wok namely 'Simple Partial Discharge Identifier (SPDI) and Fundamental Partial Discharge Identifier (FPDI) were developed to overcome the PD identification shortcoming. Experimental work was conducted to obtain PD data on both ultrasonic and electrical methods. The validated PD data acquired from ultrasonic method was used to test SPDI and compared with several models of NN. The obtained results on both SPDI and NN models were compared for consistency and lower in error. The PD data acquired from electrical method was used to test the FPDI. The comparison was made based on the less hardware used for detection while sustain the identification accuracy. FPDI uses simple probe and oscilloscope for detection while the competitors are using the PD circuit detector. Both algorithms of SPDI and FPDI demonstrate remarkable results against its competitor. The SPDI successfully produced 86.7% overall in average in detecting the PD type better than NN models. The FPDI successfully produced 99% overall in average in detecting the PD types without using any additional PD circuit or detector. The proposed novel algorithms have been proven to be reliable and trustworthy in identifying PD type better compared to other techniques.