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Partial discharges studied by dielectric response method

Background and Aim

To develop a measurement system based on dielectric response method (Arbitrary Waveform Impedance Spectroscopy technique) to study insulation systems under PD activity.



AWIS

- uses any type of repetitive waveforms;
- Fast Fourier Transform;
- Extracts frequency and the

PD Excess Current

complex amplitude of the harmonics from a single measurement.

Stochastic PD detection

- utilizes a resonant circuit for enhancing PD signals;
- PDs are detected by a comparison to an average of the signals acquired. (stochastic nature of PD)

Excess current:





PD time development measurement

The excess current waveform was integrated over a half cycle and compared with sum of detected PD signal peaks of the same period of time.

PD activity decay



PD activity oscillation



Conclusions

• PD excess current measurement is a good complement to conventional PD detection method, as it measures both large and small PDs and accounts for both number and amplitude. Additionally, it is sensitive to slow currents.

•PD activity variation studied by PD time development measurement reveals PD activity decay and oscillations; Studies also discovered existence of non-PD excess current; and PD activity variation is related to an interplay between PD activity and non-PD excess current, times and amplitudes involved can vary widely. •Non-PD excess current studies proves its existence, and illustrates some important properties of such a current.



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