FDS measurement of oil using combined AC and DC voltage

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Background

Frequency domain spectroscopy measurement is a non-invasive condition assessment method used on power components.

- Design
- Localize the fault
- Estimate the service life

Turbosquid.com
kbvresearch.com
Voltage-dependent properties in the FDS measurement of oil

Complex permittivity of oil measured under AC voltage

Deviation from linearity at low frequencies, with the imaginary permittivities decreasing with increasing voltage

Voltage-dependent phenomenon (Garton effect)
- mobile charges blocked at the boundary
- depleted from the bulk of the liquid

Bring difficulties for analysing the measurement results and comparing results measured under different situations
Measurement using combined AC and DC voltage

**Combined AC and DC voltage**

AC voltage with DC bias can **limit** the motions of ions to the **boundaries** of the oil gap, and thus **remove** the contribution due to the voltage-dependent movement of ions.

The **voltage-dependent** phenomena occurring at low frequencies owing to charge movements has been **significantly reduced**

**Conclusion**: Using the **DC bias** in the FDS measurements of oil can **significantly decrease** the **voltage dependence** of the results caused by **ion movements**.