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Partial Discharges in Synthetic ester-pressboard Dielectric

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Purpose/Aim
We need to understand one of the breakdown mechanisms of transformer dielectrics i.e. partial discharges (PD) in oil-pressboard composite insulation. In this study we conducted a PD experiment. Experimental results may be useful for online condition monitoring of large power transformer.
Experimental/Modeling methods
Effect of various impurities (i.e. Moisture in pressboards, and in oil, conducting particle (Cu) in oil as well as in pressboard surface, artificial bubbles in oil) on PD behaviors of synthetic ester –pressboard insulation system using needle –plane electrode has been investigated.
Results/discussion
PD behavior of artificial bubbled sample has similar effects of PD as compared to moisture in synthetic ester sample. It means moisture in oil and bubbles in oil had experienced same local electric field. These PD pattern results of differently modified sample may useful for better understanding of PD behaviors of synthetic ester-pressboard composite system. The same field configurations existing in power transformers.
Conclusions
Moisture in pressboard itself does not make big impact in PD pattern and PD inception voltage as compared with fresh pressboard, but in moisture variations in synthetic ester have rise in PD behaviors i.e. apparent charge (pC) and phase shifting in PD pattern. Outcome of this experiment study is an impurity in synthetic ester is contributing more the initiation of localized electric field as compared to pressboard conditions.
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