Pre-breakdown streamer propagation and breakdown characteristics of refined bleached and deodorized palm oil under lightning impulse voltage

ABSTRACT

This paper presents the investigation on the breakdown characteristics and pre-breakdown streamer propagation of Palm Oil (PO) impregnated aged pressboard under positive lightning impulse voltages. The experimental work was carried out under a non-uniform field with needle-plane electrodes configuration. The streamer stopping length and breakdown voltage of 2 types of refined, bleached, and deodorized palm oil were examined in the presence of new and aged pressboards. The pressboard was placed in parallel to the needle-plane electrode at a gap distance of 50 mm. The lightning breakdown voltage was applied to the samples based on 1 shot per step rising voltage method under positive polarity as per IEC 60897. The presence of impregnated pressboard in both PO slightly increases the 50% positive lightning breakdown voltages. PO impregnated pressboards have lower 50% positive lightning breakdown voltages than MO. After subjected to ageing, the positive lightning breakdown voltages for PO and MO impregnated pressboards decrease. In the presence of aged pressboard, the streamers in PO generally propagate further than MO at the same voltage level.

Keyword: Lightning impulse breakdown voltage; Non-uniform field; Palm oil; Aged pressboard; Streamer characteristics; Transformers