Seminar by Joint IEEE Ottawa-Montreal Section DEIS Chapter, IEEE PES Chapter Ottawa Chapter, IEEE RS/PELS Ottawa Joint Chapter and EPM of MSS/NRC

The IEEE Ottawa Section is inviting all interested IEEE members and other engineers, technologists, and students to a seminar on dielectrics and electrical insulation.

Development of Silicone Rubber Housing Composites for DC Outdoor Insulation

by

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DATE: September 09, 2013.
TIME: 1:20 p.m. Registration and Networking; 1:30 p.m. – 2:30 p.m. Seminar.
PLACE: National Research Council, 1200 Montreal Road, Ottawa, Building M-36, Kelvin Room.
PARKING: No fee at the visitor's parking. Please respect restricted areas.

Summary: Insulators constructed from polymeric materials have been replacing conventional insulators made from toughened glass and porcelain in the power system at an increasing rate. Among their many advantages, polymer insulators, particularly those made from silicone elastomers, exhibit non-wetting properties. However, in service conditions of constant wetting, silicone elastomers will eventually wet-out leading to leakage current and dry-band arcing. Heat from the dry-band arcing gives rise to thermal ablation and erosion of the silicone housing material, exposing the fiberglass core to moisture, and under voltage, tracking failure of the insulator core and the insulator occurs. While well-established formulations of insulation housing composites are in use for AC, no such formulations have been developed for DC. In particular, polymer insulators that have been designed for AC are being applied to DC, with the assumption that equivalent performance will be obtained through an adjustment of the insulation creepage distance without taking into consideration the differing aspects of the DC dry-band arc, and therefore erosion. This practice questions the existing DC insulators as an unknown entity that requires further investigation to ensure the reliability of the power supply, particularly at this time as interest in DC transmission has increased worldwide.

In this presentation, the development of housing material composites of silicone rubber, a widely utilized elastomer in outdoor insulation applications, is discussed for DC. As such, a thorough understanding of the physical mechanism of the eroding dry-band arcing under DC is investigated. To this end, the influence of inorganic fillers in silicone rubber on suppressing the effects of dry-band arcing is also presented, as a foundation for the development of a more suitable silicone composite for DC insulation.

Refat Atef Ghunem is currently a PhD degree candidate and teaching assistant at the University of Waterloo, Waterloo, Canada. He received his BSc with cum laude/honours and MSc degrees from the American University of Sharjah, Sharjah, UAE, in 2008 and 2010, respectively. From 2008 to 2010, he worked as a substation power engineer in the maintenance division of the Abu Dhabi Transmission and Dispatch Company (TRANSCO). He is the recipient of the 2012 IEEE Dielectrics and Electrical Insulation Society (DEIS) graduate student fellowship and the Abu Dhabi Water and Electricity Authority (ADWEA) scholarship. His research interests extend beyond polymeric materials for outdoor HVDC to include condition monitoring and diagnostics of electrical insulation.

Admission: Free. Registration required for security reasons,
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