

Modelling of Electroluminescence in Polymers Using a Bipolar Charge Transport Model

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Electroluminescence (EL) in polymeric materials is thought to occur due to the energy dissipation process from the recombination of opposite polarity charge carriers. It is considered as an indication of storage and transport of charge carriers in cable insulation subject to electrical stresses and may indicate the change in charge movement due to aging or degradation processes. Under ac electric fields, the interaction of opposite polarity charge carriers at the interface of polymer/conductor is enhanced compared with dc conditions, and seems to contribute a lot to the electroluminescence rather than the charge behaviours in the bulk of polymers. The dynamics of charge carriers both at the interface of polymer/conductor and in the bulk of polymers is investigated through a simulation work using a bipolar charge transport model. Figure 1 compares experimental electroluminescence results with simulated data from the recombination of injected charge carriers. The paper will give more details on EL model and comparison under various waveforms and frequencies.

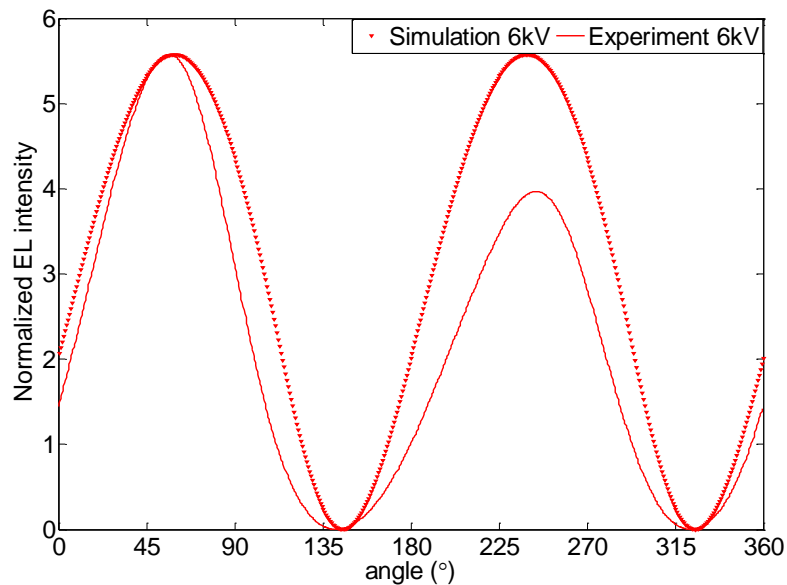


Figure 1: Comparison of electroluminescence simulation and experimental measurement

- [1] P. L. Lewin, S. J. Dodd and A. M. Ariffin, "Simulation of Electroluminescence using a Bipolar Recombination Model", *IEEE International Conference on Solid Dielectrics*, 2007, pp. 15-18.
- [2] J. Zhao, Z. Xu, G. Chen and P. L. Lewin, "Numerical Modeling of Space Charge in Polyethylene under AC Fields", *2010 IEEE International Conference on Solid Dielectrics*, 2010, Potsdam, Germany. pp. 565-568.