

Abstract Submitted  
for the GEC12 Meeting of  
The American Physical Society

**Breakdown** **volt-**  
**age calculations using PIC-DSMC** PAUL CROZIER, JEREMIAH BOERNER,  
MATTHEW HOPKINS, CHRISTOPHER MOORE, LAWRENCE MUSSON, Sandia National Laboratories — In general, modeling and simulation provide physical insight and enable extrapolative predictions beyond theory and experimental data. In the specific case of electrostatic discharges, modeling and simulation may enable extrapolative predictions of breakdown voltages and a better physical understanding of breakdown phenomena. Using our PIC-DSMC software, we compute breakdown voltages for molecular nitrogen gas and compare our results against Bolsig+ for simple 1D geometries. We further verify our breakdown voltage calculations for a simple 3D geometry. In these calculations, 25 different  $N_2$  – electron interactions are included and good agreement with Bolsig+ is observed. Our approach to computing breakdown voltages using PIC-DSMC software can be extended to the prediction of breakdown voltages in more difficult cases where experimental data may be unavailable and the Paschen equation assumptions are no longer valid, as in the cases of complex 3D geometries and microscale discharges.

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Date submitted: 14 Jun 2012

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