Spatiotemporal development of charged particle swarms in gases under the influence of electric and magnetic fields SASA DUJKO, Centre for Mathematics and Computer Science (CWI), P.O. Box 94079, 1090 GB Amsterdam, The Netherlands, ZORAN RASPOPOVIC, Institute of Physics, University of Belgrade, P.O. Box 68, 11080 Zemun, Belgrade, Serbia, RONALD WHITE, ARC Centre for Antimatter-Matter Studies, School of Electrical Engineering and Physical Sciences, James Cook University, 4810 Townsville, Australia, TOSHIAKI MAKABE, Department of Electrical Engineering, Keio University, 3-14-1 Hiyoshi, Yokohama 223, Japan, ZORAN PETROVIC, Institute of Physics, University of Belgrade, P.O. Box 68, 11080 Zemun, Belgrade, Serbia — In this work we present a systematic investigation of the synergism of magnetic field and non-conservative collisional processes on spatially resolved transport data of charged particle swarms in neutral gases under the influence of electric and magnetic fields crossed at arbitrary angles. Spatiotemporal development of the swarm is followed by a Monte Carlo simulation technique in certain collisional models of ionization and attachment over a range of angles between the fields and field strengths. Independently of the field configuration, it is found that spatial density profiles of the swarm relax to a Gaussian profile after a sufficient time with a spatial segregation of groups with different average energies resulting in a linear profile.

Sasa Dujko
Centre for Mathematics and Computer Science (CWI),
P.O. Box 94079, 1090 GB Amsterdam, The Netherlands

Date submitted: 16 Jun 2010   Electronic form version 1.4