

Abstract Submitted
for the GEC08 Meeting of
The American Physical Society

Global Models for Electronegative Discharges DEREK D. MONAHAN, MILES M. TURNER, Dublin City University, Ireland — The first step towards understanding a complex plasma is usually to develop a zero-dimensional or global model. This is difficult when the plasma is electronegative, because the literature contains many proposed models with different and sometimes contradictory detailed assumptions, and different domains of applicability. The appropriateness of such models in a given context is often hard to assess. In this paper, we present a set of detailed kinetic simulations spanning a wide range of parameters, especially with respect to electronegativity, collisionality, and type of negative ion destruction mechanism. We use these simulations as a benchmark to investigate the validity of a variety of proposed models for electronegative discharges. We reach two important conclusions: (i) that an accurate electron kinetics model is more important than any consideration relating to plasma transport in the presence of negative ions and (ii) that there exists a simple and robust transport model that is in reasonable agreement with all of our benchmark simulations, when the electrons are treated properly. We therefore commend this approach as likely to offer reasonable accuracy for modelling any electronegative discharge where a global model is likely to be useful.

Miles Turner
Dublin City University

Date submitted: 13 Jun 2008

Electronic form version 1.4