Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Modeling Electrohydrodynamic Atomization[1] BRET VAN POPPEL, OLIVIER DESJARDINS, JOHN DAILY, University of Colorado at Boulder
— Over the past decade, there has been considerable interest in controlling the emissions from small engines in the size range of 200 cm^3 or smaller. Fuel injection schemes may reduce the incidence of pollutant emissions within this class of engines. However, the cost of implementation is a barrier to large scale adoption. One approach to small-scale fuel injection is to capitalize upon the benefits of electrohydrodynamics (EHD) and enhance fuel atomization. There are many possible benefits to EHD aided atomization for combustion, such as smaller droplets, wider spray cone, and the ability to control or "tune" the spray for improved performance. In this work, we perform detailed numerical simulations of EHD-aided liquid breakup in the context of Diesel injection using the new adaptive spectrally refined interface (ASRI) tracking method coupled to a robust and accurate Navier-Stokes/Ghost fluid solver. This novel interface tracking methodology provides several features that improve the accuracy and resolution of the liquid structures. Relevant parameters, such as Weber number, electric Reynolds number, electric Bond number, and charge ratio, are varied to assess the effect of EHD on primary atomization.

[1]The authors gratefully acknowledge financial support from Army Research Office.

Bret Van Poppel
University of Colorado at Boulder

Date submitted: 03 Aug 2009 Electronic form version 1.4