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Approaches for Modeling Self Organization in Plasmas. LUIS MARTINEZ, AKASH DHRUV, ELIAS BALARAS, MICHAEL KEIDAR, George Washington University — Self-organization of plasmas has been reported for various applications in which plasmas interact with media. Our current work investigates interactions of cold atmospheric plasma (CAP) with biological media which occur when a CAP jet impinges onto the surface of interest. As part of our research, we study the principle drivers of non-equilibrium which lead to plasma self-organization, both by conducting experiments and by modeling plasma-media interactions. To test parameters of interest, experiments vary media targets, gas types and flow rates, voltages, electrode configurations, and gaps between jet nozzle and target. The model simulates the geometry and evolution of these experiments by solving a coupled system of transient Navier-Stokes and species transport equations accounting for diffusion, advection, reaction, generation, and supply for each species of interest on a PARAMESH block-structured adaptive mesh refinement (AMR) grid. Additionally, a mechanism for streamer contact spot advection on a target's surface is proposed and simulated by using a level-set technique which defines the boundary between streamers and targets. Preliminary results indicate that experimental parameters change the frequency of ionization wave fronts in the discharge column, spectrum of reactive oxygen and nitrogen species, and electric fields induced on the media from the accumulation of charges.

Luis Martinez
George Washington University

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