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1P16 - MODELING ELECTRODE CONFIGURATIONS FOR NANOSECOND PULSED PLASMAS

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Nanosecond pulsed plasmas (NPPs) can efficiently generate ionized and excited species. While numerous studies have examined local flow field effects [1], characterization of the induced flow field and electrode geometry and the induced flow field remains incomplete. We hypothesize that altering the electrode configuration to modify the electric field will strongly influence plasma species generation and the induced flow field, motivating the development of a more comprehensive model.

This study couples a quasi-one dimensional model for a parallel plate geometry [2] to BOLSIG+ to better characterize plasma species generation [3]. The implication of electrode configurations, such as pin-to-pin and pin-to-plate, on the induced electric field and generated species will be examined. The long-term incorporation of this model into a high fidelity computational fluid dynamics (CFD) model and comparison to spectroscopic results under quiescent and flowing conditions will be discussed.

1. A. V. Likhanskii, M. N. Shneider, S. O. Macheret, and R. B. Miles, "Modeling of dielectric barrier discharge plasma actuator in air,"J. Appl. Phys., vol. 103, 2008, Art. no. 053305.
2. I. V. Adamovich, M. Nishihara, I. Choi, M. Uddi, and W. R. Lempert, "Energy coupling to the plasma in repetitive nanosecond pulse discharges,"Phys. Plasmas, vol. 16, no. 11, 2009, Art. no. 113505.
3. G. J. M. Hagelaar and L. C. Pitchford, "Solving the Boltzmann equation to obtain electron transport coefficients and rate coefficients for fluid models,"Plasma Sources Sci. Technol., vol. 14, no. 4, pp. 722–733, 2005.

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