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Temporal Development of Self-Organized Patterns at the Plasma-Liquid Interface for a Helium DC pulsed discharge[1] TANUBHAV KUMAR SRIVASTAVA, MARIEN SIMENI SIMENI, PETER BRUGGEMAN, University of Minnesota — Self-organization at the plasma-liquid anode interface is a commonly observed phenomenon for atmospheric pressure plasmas, resulting in patterns with distinctive shapes such as circular rings, star shaped and rotating gear-like structures, depending primarily on the current and solution conductivity. A recent study shows pattern formation can be predicted by Turing stability analysis of the electron and ion reaction diffusion processes in the anode sheath. In the present study, we report on the temporal development of self-organized patterns at the anode plasma-liquid interface for different anode solution conductivities. The model outcome was consistent with the experimentally determined conductivity threshold for pattern formation to occur. While the trend observed in the calculated time constants of instability formation was consistent with experimental observations, the model values were orders of magnitude faster than experimental observations, indicating effects much slower but not considered in the model might impact pattern formation.

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