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Breakdown in Atmospheric Pressure Plasma Jets: Nearby Grounds and Voltage Rise Time[1] AMANDA LIETZ, MARK J. KUSHNER, University of Michigan — Atmospheric pressure plasma jets (APPJs) are being investigated to stimulate therapeutic responses in biological systems. These responses are not always consistent. One source of variability may be the design of the APPJs – the number and placement of electrodes, pulse power format – which affects the production of reactive species. In this study, the consequences of design parameters of an APPJ were computationally investigated using *nonPDPSIM*, a 2 d model. The configuration is a cylindrical tube with one or two ring exterior electrodes, with or without a center pin electrode. The APPJ operates in He/O_2 flowing into humid air. We found that the placement of the electrical ground on and around the system is important to the breakdown characteristics of the APPJ, and the electron density and temperature of the resulting plasma. With a single powered ring electrode, the placement of the nearest ground may vary depending on the setup, and this significantly affects the discharge. With two-ring electrodes, the nearest ground plane is well defined, however more distant ground planes can also influence the discharge. With an ionization wave (IW) that propagates out of the tube and into the plume in tens of ns, the rise time of the voltage waveform can be on the same timescale, and so variations in the voltage rise time could produce different IW properties. The effect of ground placement and voltage waveform on IW formation (ns timescales) and production of reactive neutrals (ms timescales) will be discussed.

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