Abstract Submitted
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Scaling of Small Arrays of Microplasmas[1] CHENHUI QU, PENG TIAN, MARK J. KUSHNER, University of Michigan — Arrays of microplasmas have meta-material capabilities that enable altering the properties of incident electromagnetic waves. The desirable properties of these microplasma arrays (MPAs) are high plasma density, rapid re-configuration and a minimum of isolating structures between microplasma elements that might perturb the dielectric properties of the array. These attributes are in part achieved by tradeoffs between gas mixture, pressure and pulse-power waveform. In this paper, results from a computational investigation of MPAs sustained in rare gas mixtures will be discussed. A 2-dimensional plasma hydrodynamics model with radiation transport was used to investigate the ability to modulate the permittivity of small MPAs – up to 4 x 4 elements. Gas pressures are tens to hundreds of Torr in mixtures of rare gases (e.g., Ar/Xe). We found that in the absence of isolating structures, there is significant cross talk between the elements of the MPAs when using repetitive uni- and bi-polar pulses (tens to hundreds ns duration). For example, when alternate elements of the array are pulsed, unpowered electrodes of adjacent pixels may appear cathodic or anodic to its neighbors, thereby attracting current through the unpowered pixel.

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