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Modeling of surface plasma discharge induced by spoof surface plasmon polariton in high pressure YUNHO KIM, LAXMINARAYAN RAJA, Univ of Texas, Austin — Spoof Surface Plasmon Polariton (SSPP) is an electromagnetic wave strongly confined near the surface of a corrugated metal surface (meta-surface) filled with dielectric materials. Our group previously studied how the SSPP excited in microwave regime can be used to generate a uniformly elongated argon plasma with electron number density on the order of $1.0\text{x}10^{19}\text{m}^{-3}$ or higher. The conduction channel formation among the periodic elements (metal-dielectric) is well studied for the operating pressure around 10 Torr, but both physical and numerical difficulties associated with high pressure discharges in 100 ˜760 Torr were encountered. Less diffusivity and mobility of electrons in higher pressure hinder the formation of uniformly elongated conduction channel, which we address in this work. Possible solutions to the problem such as adding a dielectric layer on the meta-surface and its reflection spectrum are discussed to understand the resonant behaviors the meta-material. A self-consistent model for the description of plasma coupled with Maxwell's equations is used in this numerical study. Transients of plasma-wave interactions at varying pressures are presented to provide the details of the microwave generated plasma.

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