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Modeling Argon Plasma Excimer Characteristics near a Dielectric Surface in Miniaturized Volumes[1] ASHRAF FARAHAT, College of Applied and Supporting Studies, King Fahd University of Petroleum & Minerals (KFUPM), Dhahran 31261, Saudi Arabia, EMAD RAMADAN, Department of Information and Computer Science, King Fahd University of Petroleum and Minerals, Dhahran 31261 Saudi Arabia — We computationally model plasma -neutral gas dynamics in a miniaturized microthruster encloses Ar and contains a dielectric material sandwiched between two metal plates using a two dimensional plasma model. Spatial and temporal plasma properties are investigated by solving the Poisson equation with the conservation equations of charged and excited neutral plasma species. We find the microthruster properties to depend on small changes in the secondary electron emission coefficient that could result from dielectric erosion and aging. The changes also affect the electrohydrodynamic force produced when we use the microthruster to generate thrust for small spacecrafts. The electrohydrodynamic force is calculated and found to be significant in the sheath area near the dielectric layer and is found to affect gas flow dynamics including the Ar excimer formation and density. The plasma-neutral gas momentum exchange is significant in affecting gas flow dynamics and in the formation of excimer species in addition to affecting the UV and visible emission characteristics of the device.

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Ashraf Farahat
King Fahd University of Petroleum and Minerals

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