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Effects of Boundaries on Plasma Jet Formation[1] MEHMET AKMAN, Old Dominion University, ERDINC KARAKAS, University of Houston, MOUNIR LAROUSSI, Old Dominion University — The dynamics of non thermal plasma jets consisting of plasma bullets change with background gas pressure. Our recent study indicates that this dependence is not limited to the pressure alone but also to a physical boundary confining the working gas flow. It is observed that in a Helium filled chamber, no plasma bullet propagation occurs; however inside the tube in which the Helium is flown into the chamber, plasma bullet propagation is visible. The physical boundary created by this tube enables the bullets to propagate while the lack thereof inside the chamber results in the diffuse plasma at the same pressure. This boundary does not need to be an object that surrounds the gas flow. This is evident when a background gas different than helium is introduced into the chamber. In this case, at the same pressure (75 torr), the diffuse plasma transitions into a jet as a result of the formation of a helium channel in which the plasma bullets propagate. The background gas creates a boundary layer around the helium flow inside the chamber. Therefore, it is believed that in order for plasma bullets to propagate, there needs to be a boundary surrounding the gas channel. In addition to this visual observation, in the case of helium, emission profile in VIS range also shows distinct transitions, specifically at 587.4nm. In this paper, experimental evidence supporting these observations explained above will be presented.

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Mehmet Akman
Old Dominion University

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