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The Spatial-temporal Evolution and Interaction of 3-D Multiple Pulsed Plasma Jets

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Pulsed plasma jet with the advantages of compact size, low cost, abundant reactive species and flexibility have been a hot spot in recent years. The application of pulsed plasma including surface modification, medical application and environmental protection, etc. Especially, by grouping individual plasma jets together, large area and abnormal shape subjects can be easily treated. In this study, a coaxial designed 3-D multiple plasma jet array driven by nanosecond pulse power supply are well studied. The plasma jet array is composed with six individual plasma jets coaxial arranged and focused toward the center, which is ideal for cylindrical subject treatment. The electrical characteristics, optical emissions, spatial-temporal evolution and interaction of plasma jet array with and without subject are investigated. With applied voltage of 8 kV, only one plasma jet is ignited and all of the plasma jets are ignited when applied voltage increased to 12 kV. Further increase of voltage turns to arc discharge. The dynamic of ionization front of plasma jet array behaves differently with and without cylindrical subject: The ionization front moves in a faster speed on metal subject and seems to be more disperse on insulating surface. Plasma bullet reflection effect is observed when touching with the metal surface. More details will be shown and discussed in the paper.

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