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Multivariate analysis of an Industrial atmospheric pressure glow discharge VICTOR LAW, Dublin City University, BARRY TWOMEY, JOHN TYNAN, University College Dublin, NIALL O'CONNOR, Dublin City University, DENIS DOWLING, University College Dublin, STEPHEN DANIELS, Dublin City University, VICTOR LAW TEAM, DENIS DOWLING TEAM — This paper explores the Multivariate Analysis (MVA) of the APGD electrical outputs (non-sinusoidal periodic voltage current waveforms and drive frequency). A Principle Component analysis (PCA) model is used to compress the electrical data for the generation a real-time loading plot. A Lissajous figure projection of the current and voltage waveforms is also used to identify system instabilities and micro-scale events. The purpose the PC-space and phase-space is to provide new coordinate systems where the surface treatment outcomes may be mapped directly. Visual information on the discharge uniformity is also overlaid to aid process interpretation. The complete data acquisition, data compression, and displays are performed in real-time using National Instruments LabVIEW 8.2 software. The results of the MVA demonstrates that a helium discharge, a helium discharges containing 1% oxygen and a helium discharge with hexamethyldisiloxane yields different loading plot scores which allow data-set separation and unique process identification.

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