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Experimental Characterization of a Plasma Deflagration Accelerator for Simulating Fusion Wall Response to Disruption Events[1] THOMAS UNDERWOOD, KEITH LOEBNER, MARK CAPPELLI, Stanford University —

In this work, the suitability of a pulsed deflagration accelerator to simulate the interaction of edge-localized modes with plasma first wall materials is investigated. Experimental measurements derived from a suite of diagnostics are presented that focus on the both the properties of the plasma jet and the manner in which such jets couple with material interfaces. Detailed measurements of the thermodynamic plasma state variables within the jet are presented using a quadruple Langmuir probe operating in current-saturation mode. This data in conjunction with spectroscopic measurements of Hα Stark broadening via a fast-framing, intensified CCD camera provide spatial and temporal measurements of how the plasma density and temperature scale as a function of input energy. Using these measurements, estimates for the energy flux associated with the deflagration accelerator are found to be completely tunable over a range spanning 150 MW m^{-2} - 30 GW m^{-2}. The plasma-material interface is investigated using tungsten tokens exposed to the plasma plume under variable conditions. Visualizations of resulting shock structures are achieved through Schlieren cinematography and energy transfer dynamics are discussed by presenting temperature measurements of exposed materials.

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