Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Plasma Sensor Measurements in Pulse Detonation Engines ERIC MATLIS, CURTIS MARSHALL, THOMAS CORKE, University of Notre Dame, SIVARAM GOGINENI, Spectral Energies, LLC — Measurements have been conducted in a pulse detonation and rotating detonation engine using a newly developed plasma sensor. This sensor relies on the novel approach of using an ac-driven, weakly-ionized electrical discharge as the main sensing element. The advantages of this approach include a native high bandwidth of 1 MHz without the need for electronic frequency compensation, a dual-mode capability that provides sensitivity to multiple flow parameters, including velocity, pressure, temperature, and gas-species, and a simple and robust design making it very cost effective. The sensor design is installation-compatible with conventional sensors commonly used in gas-turbine research such as the Kulite dynamic pressure sensor while providing much better longevity. Developmental work was performed in high temperature facilities that are relevant to the propulsion and high-speed research community. This includes tests performed in a J85 augmentor at full afterburner and pulse-detonation engines at the University of Cincinnati (UC) at temperatures approaching 2760°C (5000°F).

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Date submitted: 29 Jul 2014 Electronic form version 1.4