Green Energy Summit

Topical Session 2-8

Date: **Thursday, March 25, 2010**

Time: 4:40 p.m. – 5:00 p.m.

Presentation: ***"Parametric Study of the Primary Entrainment Region of a Gas-Storage Water Heater"***

Daniel Sherwin
Student, Marquette University

It is estimated that 60 million residential gas-storage water heaters are currently operating in the United States. The emissions produced from these devices account for 30 tons of atmospheric nitric oxide annually. Optimization of combustion in current economical burner designs, to reduce emissions and expand operating fuels/conditions, requires a greater understanding of the fuel mixing and combustion process inherent with the pancake burner. The fuel mixing process in the primary-entrainment region of a commercial burner was studied via two laser diagnostic techniques. Planer laser induced florescence and particle image velocimetry were used to characterize the scalar fuel concentration field and air-fuel velocity field of an operational in-situ pancake burner. Two primary parameters were varied, the burner geometry and fuel nozzle architecture, to learn the effect on the turbulent mass and momentum transport phenomena important in the fuel mixing process. Results of the parametric study were used to resolve the primary air-to-fuel ratio as well as the local air entrainment coefficient from different operating conditions. Varying fuel nozzles and burner geometries showed different air-fuel ratios at the burner entrance closely correlated with Reynolds number.

Presenter Biography:

Daniel Sherwin

Daniel Sherwin graduated from Marquette University in 2008 with a BSME. An interest in combustion, fluid flow, IC engines, and experimental techniques served as the impetus to pursue graduate studies. Currently working under the guidance of Dr. Koch at Marquette University, Daniel is conducting research on gas-storage water heaters contributing towards a MSME thesis (expected graduation May 2010).