

Mechanical Engineering Department Seminar

3:35pm March 5, 2014
1130 Mechanical Engineering
111 Church Street SE, Minneapolis, MN 55455

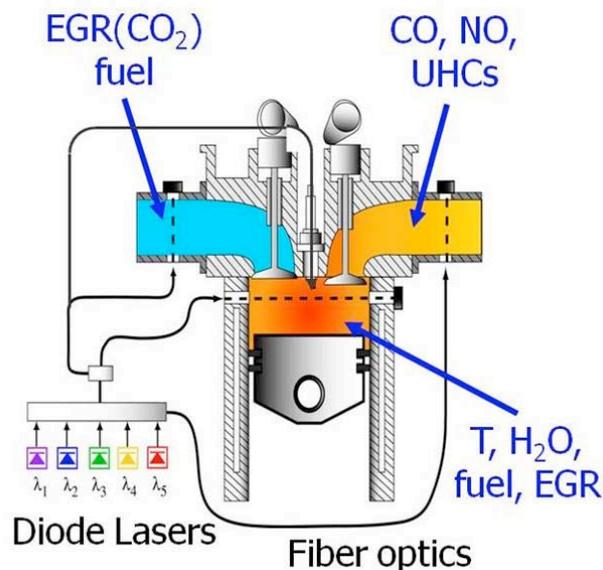


Tunable Diode Laser Absorption Sensing for Combustion and Propulsion

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Wavelength-tunable diode lasers (TDLs), derived principally from initial developments in the telecommunications industry, are convenient light sources for line-of-sight absorption spectroscopy and laser-based sensors. This presentation will provide an overview of work at Stanford University to develop and apply TDL sensors for non-intrusive monitoring of combustion and propulsion flows. Quantities of interest include temperature, various species concentrations, velocity and derived quantities such as mass, momentum and enthalpy flux. Examples will be drawn from successful applications in diverse facilities including piston engines, scramjets, pulse detonation engines, coal gasifiers, coal-fired powerplants, aeroengine inlets, arcjets and shock tubes. Extensions of TDL sensing into the near- and mid-infrared, for improved detection of CO, CO₂ and H₂O will be presented, including example applications in multi-phase flows.



Bio: Professor Hanson earned a B.S. degree in mechanical engineering from Oregon State University, M.S. in mechanical engineering from Arizona State University and Ph.D. in aeronautics and astronautics from Stanford University. He has been affiliated with the mechanical engineering department at Stanford since 1972, serving as department chair from 1993-2003 and holding the Woodard Chair from 1994. He has advised over 85 Ph.D. graduates, including 23 appointed to faculty positions, and authored or co-authored over 1000 technical publications in the fields of laser diagnostics and sensors, shock wave physics, advanced propulsion and combustion chemistry. Dr. Hanson is a Fellow of the American Institute of Aeronautics and Astronautics (AIAA), the American Society of Mechanical Engineers (ASME) and the Optical Society of America (OSA), and is a member of the National Academy of Engineering (NAE). He is a recipient of the Silver Medal and the Alfred Egerton Gold Medal of the Combustion Institute, the R.I.Soloukhin Award of the Institute for Dynamics of Explosions and Reactive Systems (IDERS), the AIAA Awards for Propellants and Combustion and for Advanced Measurement Technology, and a co-winner of the SAE Colwell Merit Award.