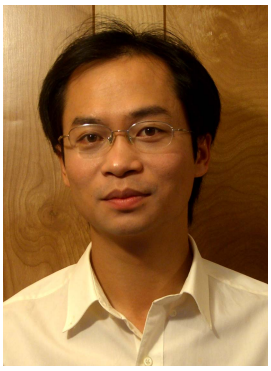

Dr. Lin Ma
Thermal/Fluid Sciences

Assistant Professor
PhD, Stanford University, 2006
MS, Stanford University, 2001
BS, Tsinghua University, 2000

Teaching Interests
Thermodynamics, heat transfer, fluid dynamics

Research Interests
Laser diagnostics
Application of advanced optical sensors in practical devices
Laser sensors for multiphase flows

Lin Ma joined the department in 2006. His teaching and research interests lie in the general areas of thermal/fluid sciences. Advanced laser diagnostics are extensively utilized in Dr. Ma's research to attack many scientific and industrial challenges, ranging from improving the efficiency of engines, reducing the pollutants of combustors, to developing new engines. He is a senior member of the AIAA, and member of the OSA and SAE. He was a recipient of the NSF CAREER award (2009) for his project entitled "Resolving Turbulence-Chemistry Interaction Using Novel Laser Diagnostics".

Research Topics:

Laser diagnostics for multiphase flows

Rapid and reliable measurements of critical properties in multiphase flows (e.g., temperature, vapor concentration, and droplets/particulates density) are highly desirable, and yet challenging, in many scientific and industrial applications. This research develops novel imaging techniques to address such important measurement needs. These techniques use wavelength-multiplexed absorption and photodissociation spectroscopy to overcome the challenges.

Tomographic imaging based on hyperspectral spectroscopy

This research seeks to significantly enhance the performance of tomography techniques using hyperspectral absorption spectroscopy. Traditional tomography techniques usually use a few wavelengths, which results in cumbersome experimental requirements and limited measurement capability. This research exploits the spectral information content enabled by hyperspectral lasers to reduce experimental complexity, improve imaging accuracy, and enable simultaneous monitoring of multiple properties (e.g., concentration and temperature).

Industrial applications

Besides their applications in scientific research, laser diagnostics have been proven to be superior to conventional methods in many industrial applications. These laser-based methods have shown good perspective to solve problems now confronting industry, such as temperature and pollutants monitoring. Fuel monitoring and control are critical to most combustion applications. Therefore, a natural and important research topic is to adopt such diagnostics to industrial applications.

Selected Publications:

• Ma, L.; Cai, W.; Caswell, A.W.; Kraetschmer, T.; Sanders, S.T.; Roy, S.; Gord, J.R.; Tomographic imaging of temperature and chemical species based on hyperspectral absorption spectroscopy, Optics Express, 2009, in press.

• Zhao, Y.; Tong, C.; Ma, L.; Assessment of a novel flow visualization technique using photodissociation spectroscopy, Applied Spectroscopy, v. 63, no. 2; p. 199-206, Feb. 2009.

• Ma, L.; Hanson, R.K.; Measurement of aerosol size distribution functions by wavelength-multiplexed laser extinction, Applied Physics B, v.81, no.4, p.567-576, Aug. 2005.

• Ma, L.; Sanders, S.T.; Jeffries, J.B.; Hanson, R.K.; Monitoring and control of a pulse detonation engine using a diode-laser fuel concentration and temperature sensor. Proceedings of the Combustion Institute, v. 29, no. 1, p.161-166, Jan. 2002.