ME Seminar

A Highlight of Recent Efforts in Low Green House Gas Combustion Research at Sandia

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ABSTRACT

High efficiency, low-emission and reduced carbon footprint technologies will drive the future of both automotive engines and gas turbines for the next several decades. Though, there is a strong shift towards electrification especially in the personal mobility sector, it is reasonable that the hard to electrify commercial and off-road sectors will remain hybrid or purely combustion engines. Further, the aviation sector is geared towards the use of sustainable aviation fuels (SAF) as drop in fuels to reduce greenhouse gas emissions. Understanding the ignition and combustion behavior while exploring its impact on pollutant formation and relating them to the physical and chemical makeup of alternative fuels is one of the biggest challenges of our time. This talk will highlight some of our recent efforts and future directions at CRF involving various low greenhouse gas (GHG) fuels for in cylinder combustion with a key emphasis on understanding the interplay between the various physical and chemical process that dictate ignition, combustion, and pollutant formation in internal combustion (IC) engines from a fundamental perspective using a suite of optical and laser diagnostics techniques in addition to comprehensive thermodynamic analysis.

ABOUT THE SPEAKER

Rajavasanth Rajasegar was born in Pondicherry, India. He received his B.S degree in Mechanical Engineering from National Institute of Technology, Tiruchirapalli, India in 2011. He was awarded the Deutscher Akademischer Austausch Dienst (DAAD) fellowship in 2010 and the Department Gold Medal for the best outgoing student in 2011. He later received his M.S. and Ph.D. degrees in Mechanical Science and Engineering from University of Illinois at Urbana-Champaign in 2013 and 2018, respectively. His doctoral dissertation was focused on understanding flame dynamics and combustion instability mitigation strategies including plasma assisted combustion and mesoscale flame interaction in premixed combustion systems using high-speed laser and optical diagnostics coupled with application of advanced algorithm-based data processing tools. He also developed a prototype, additive manufactured (3-D printed), compact, scalable mesoscale combustor architecture intended for next generation compact naval gas-turbines. During his time at University of Illinois, he was the recipient of the Mavis Future Faculty Fellowship in 2016 and the Graduate Teaching Fellowship in 2014 and 2015. He is currently a post-doctoral fellow at the Combustion Research Facility (CRF), Sandia National Laboratories, Livermore, California. His current research is primarily focused on the use of various low greenhouse gas (GHG) fuels such as natural gas, LPG, e-fuels such as OME and hydrogen etc., for in-cylinder combustion with a key emphasis on understanding the interplay between the various physical and chemical process that dictate ignition, combustion and pollutant formation in internal combustion (IC) engines from a fundamental perspective using a suite of optical and laser diagnostics techniques in addition to comprehensive thermodynamic analysis.

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