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SHORT BIO:

Joe has been actively engaged in research in a broad range of topics in combustion simulation and modeling sponsored by the DOE Office of Science, Basic Energy Sciences program; the DOE Office of Energy Efficiency and Renewable Energy, Vehicle Technologies program; NASA, DOD and industry. He is active within a number of professional societies including the Combustion Institute, American Institute of Aeronautics and Astronautics (AIAA), and Society of Automotive Engineers (SAE). He serves on the Editorial Board of The Combustion Institute and is Editor for the Proceedings of The Combustion Institute. He is an Associate Editor for the Journal of Propulsion and Power, and member of the AIAA Propellants and Combustion Technical Committee. He also serves on the Organizing Committee for the TNF Workshop (http://www.ca.sandia.gov/TNF).

RESEARCH INTERESTS

Joe's research interests are interdisciplinary, with focus on the theory, numerical modeling, and analysis of complex fluid flows where turbulence, combustion, high-pressure phenomena, and (or) multiphase flows play a controlling role. Concurrent interests are focused in the general area of numerical methods for partial differential equations, with emphasis on computational fluid dynamics (CFD), applied numerical analysis, and massively-parallel high-performance computing. He has extensive experience in the development and application of the large-eddy-simulation (LES) technique to both fundamental flows and device-scale components such as internal-combustion engines, gas turbines and liquid-rockets. To facilitate these activities he has developed a unique massively-parallel code framework that handles fully-coupled, three-dimensional, reacting, multicomponent and (or) multiphase flows with complex (non-ideal) thermochemistry, thermodynamics and transport in complex geometries.

EDUCATION

Ph.D. Mechanical Engineering, The Pennsylvania State University, 1997

M.S. Mechanical Engineering, The Pennsylvania State University, 1992

B.S. Mechanical Engineering (Highest Honors), Rutgers University, 1989

AWARDS, HONORS AND MEMBERSHIPS

Invited Plenary Lecture, 8th US National Combustion Meeting, 2013

AIAA Sustained Contribution in Aeronautics and Astronautics Award, 2013

ILASS Americas William Robert Marshall Award, 2012

Distinguished Member of Technical Staff, Sandia Special Appointment, 2011

Distinguished Paper Award, 31st International Symposium on Combustion, 2007

Editorial Board, The Combustion Institute, 2008–Present

Associate Editor, Proceedings of The Combustion Institute, 2008 – Present

Associate Editor, Journal of Propulsion and Power, 2004–Present

Member, AIAA Propellants and Combustion Technical Committee, 2003–Present

Chair, AIAA Propellants and Combustion Technical Committee, 2010–2012

Editor, Special issue of Combustion Science and Technology, 178(1-3), 2006

SELECTED PUBLICATIONS & PATENTS

R. N. Dahms and J. C. Oefelein. On the transition between two-phase and single-phase interface dynamics in multicomponent fluids at supercritical pressures. Physics of Fluids, 25: 092103, 2013.

R. N. Dahms, J. Manin, L. M. Pickett, and J. C. Oefelein. Understanding high-pressure gas-liquid interface phenomena in diesel engines. Proceedings of the Combustion Institute, 34: 1667–1675, 2013.

L. Lu, P. M. Najt, T.-W. Kuo, V. Sankaran, and J. C. Oefelein. A fully integrated linear eddy and chemistry agglomeration method with detailed chemical kinetics for studying the effect of stratification on HCCI combustion. Fuel, 105: 653–663, 2013.

J. C. Oefelein, R. N. Dahms, G. Lacaze, J. L. Manin, and L. M. Pickett. Effects of pressure on the fundamental physics of fuel injection in diesel engines. Proceedings of the 12th International Conference on Liquid Atomization and Spray Systems, ISBN 978-88-903712-1-9.

J. C. Oefelein, R. N. Dahms, and G. Lacaze. Detailed modeling and simulation of high-pressure fuel injection processes in diesel engines. International Journal of Engines, 5(3): 1–10, 2012.

R. Knaus, J. Oefelein, and C. Pantano. On the relationship between the statistics of the resolved and true rate of dissipation of mixture fraction. Flow, Turbulence and Combustion, 89(1): 37–71, 2012.

G. Lacaze and J. C. Oefelein. A non-premixed combustion model based on flame structure analysis at supercritical pressures. Combustion and Flame, 159: 2087–2103, 2012.

B. Hu, M. Musculus, and J. Oefelein. The influence of large-scale structures on entrainment in a decelerating transient turbulent jet revealed by LES. Physics of Fluids, 24: 045106, 2012.

A. M. Kempf, B. J. Geurts, and J. C. Oefelein. Error analysis of large eddy simulation of the turbulent non-premixed Sydney bluff-body flame. Combustion and Flame, 158: 2408–2419, 2011.

J. H. Frank, S. A. Kaiser, and J. C. Oefelein. Analysis of scalar mixing dynamics in LES using high-resolution imaging of laser Rayleigh scattering in turbulent non-reacting jets and non-premixed jet flames. Proceedings of the Combustion Institute, 33: 1373–1381, 2011.