6th International Conference and Exhibition on

Mechanical & Aerospace Engineering

November 07-08, 2018 | Atlanta, USA



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Supercritical fluid and applications in propulsion systems

A s pressure and temperature in the propulsion system increase to enhance performance, the injection of fuels or propellants finds themselves under supercritical conditions which pose challenges both from experimental and computational perspectives. This work intends to present a review of the state of knowledge in the context of fuel or propellants injected into the combustion chamber. As an example, in cryogenic H2/LOX liquid rocket engines, such as Space Shuttle Main Engine (SSME) or Vulcain (Ariane 5), the injected liquid oxygen (LOX) finds itself in a supercritical condition. Improved understanding of the fluid injection physics under such conditions are needed for the better design of such propulsion systems.

Biography

Bruce Chehroudi, Professor and Department Head, Mechanical Engineering Department at Arkansas Tech University, has accumulated years of leadership and administrative experiences in different capacities and organizations. This includes such positions as Managing Director at Advanced Technology Consultants, Principal Scientist and Group Leader at the ERC Inc (appointed at Air Force Research Laboratory (AFRL)), Chief Scientist at Raytheon STX, Visiting Technologist at Ford's Advanced Manufacturing Technology Development (AMTD) center, tenured Professor of Mechanical Engineering at Kettering University and University of Illinois and served as a Senior Research Staff/Research Fellow/Post-doctrate at Princeton University. He directed numerous multimillion-dollar interdisciplinary projects in areas involving chemically reacting flows, combustion and emission of pollutants, sustainable and alternative energy sources, distributed ignition, material/ fuel injection, advanced pollution reduction technologies, propulsion concepts, gas turbine and liquid rocket engines, combustion instability, laser optical diagnostics, spectroscopy, supercritical fluids and applications in environmental and propulsion systems, advanced composites, MEMS, nanotechnology and microfluidics. He has more than 150 publications with extensive experience in both scientific and management areas and intensive training in finance and financial engineering.

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