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Combustion of alternative and renewable fuels in trapped vortex combustor

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Computational Fluid Dynamics analysis was used in this study to test the combustion performance and emissions from Vortex Trapped Combustor when natural gas (methane) was replaced with renewable and alternative fuels such as hydrogen, syngas fuels with high hydrogen content and biogas. The power from the combustor was kept constant for all the fuels tested in this study. The mathematical equations describing the fuel combustion are based on the equations of conservation of mass, momentum, and energy together with other supplementary equations for the turbulence (k-epsilon), non-premixed combustion (mixture fraction/pdf model), and radiation. The temperature, flame shape, flow field, species concentrations such OH inside the Trapped Vortex Combustor and the NOX and CO2 emissions at the exit from the combustor will be presented in this paper.

Biography

Chaouki Ghenai is an Assistant Professor at the Ocean and Mechanical Engineering Department, College of Engineering and Computer Science at Florida Atlantic University. Dr. Ghenai earned his PhD in mechanical engineering from Orleans (France) University in 1995. After his PhD, He worked as a visiting research professor at Cornell University, Ithaca, New York and University of California Los Angeles, Los Angele, California. In 2001, He joined the Applied Research Center (ARC) at Florida International University (FIU) in Miami as a Combustion Manager. In 2006, He joined the Ocean and Mechanical Engineering Department at Florida Atlantic University, Boca Raton, Florida. Dr. Ghenai is leading the Combustion, Alternative fuels, and Renewable Energy Research Programs at FAU. His research interests are combustion, energy efficiency, biofuels, alternative fuels, clean combustion technologies, renewable energy, sustainability, sustainable development, thermal-fluids, laser diagnostics, computational fluid dynamics, air pollution, and waste to energy process.

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