

Combustors, Micro-Combustors, Turbines, Advanced Cycles & Designs

Papers Presented at the AIAA SciTech Forum and Exposition
2024

Orlando, Florida, USA
8 – 12 January 2024

ISBN: 979-8-3313-0467-6

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 34922 Uwytkug'Xcmg{'Ftkxg.'Uwky'422, Reston, VA 20191, USA.

TABLE OF CONTENTS

COMBUSTORS, MICRO-COMBUSTORS, TURBINES, ADVANCED CYCLES & DESIGNS

Design Considerations and Imaging Setup for Liquid Fuel Droplet Experiments	1
<i>Nicolas Berube, Daniel R. Dyson, Hamil Patel, Anthony Aguilera, Sydney M. Briggs, Subith Vasu</i>	
Effect of Spent FCC Catalyst During Pyrolysis of Poly Ethylene Terephthalate	9
<i>Fathi Aktas, Kiran Raj Goud Burra, Ashwani K. Gupta</i>	
Effect of Internal and External Swirls on Near-Field Spray Characteristics of Swirl Burst Injectors Using High-Speed X-Ray Imaging.....	17
<i>Md Shakil Ahmed, John Cary, Kamel Fezzaa, Samuel Clark, Stephen T. McClain, Lulin Jiang</i>	
Compact Resistive Heating Catalytic Reactor for in-Situ Fuel Reforming to Hydrogen	32
<i>Kiran Raj Goud Burra, Murat Sahin, Ashwani K. Gupta</i>	
DME-Propane Autoignition Measurements Inside a Shock Tube	38
<i>Zuhayr Pasha Mohammed, Justin Urso, Ramees Khaleel Rahman, Christopher W. Dennis, Michael Pierro, Subith Vasu</i>	
Design and Characterization of Shock Tube Fuel Injection for Combustors.....	45
<i>Marley A. Albright, Michelle Franzen, Justin Urso, Subith Vasu</i>	

EMERGING FUELS AND THE POWER SYSTEMS

Development of a Toroidal Jet-Stirred Reactor for Combusting NH ₃ -H ₂ Mixtures at High Pressure.....	51
<i>David S. Zamora, Marzuqa Ahmed, Emilio Pereira, Guillermo Barrios, Amanda Maia, Justin J. Urso, Ramees Khaleel Rahman, Subith Vasu</i>	
A Priori Investigation of Coupled Radiative Flamelet Generated Manifolds to Predict Solid Fuel Flame Spread.....	57
<i>Kenneth L. Budzinski, Paul DesJardin</i>	
The Effect of the Fuel Change from Petroleum Kerosene to Sustainable Aviation Fuel on the Emission of an RQL Sector Combustor Under Simulated In-Flight Conditions	77
<i>Keiichi Okai, Hitoshi Fujiwara, Takuya Mizuno, Mitsumasa Makida</i>	
N ₂ O Absorption Cross Section Measurements in a Shock Tube at High Pressures and Temperatures	87
<i>Alex Pothén, Nikolas Hulliger, Christopher W. Dennis, Justin Urso, Michael Pierro, Subith Vasu, Cory Kinney</i>	
Design and Characterization of Modular Test Section for High-Pressure Shock Tube to Enable Endwall Measurements and Imagery.....	95
<i>Samuel Q. Klopp, Marley A. Albright, Jonathan McGaunn, Michael Pierro, Christopher W. Dennis, Justin J. Urso, Subith Vasu</i>	

ADVANCED IN RENEWABLE ENERGY

Design and Development of NACA Blade Profile in a Vertical Axis Wind Turbine for an Improved Wind Energy Harvest	101
<i>Israel Ajayi, Emmanuel O. Ogedengbe, Olugbenga Noah, Adeyinka Oluwo</i>	
Self-Ignition Timing of an Integrated Hydrothermal Conversion of Moisture-Rich Biomass with Anaerobic Digestion.....	128
<i>Emmanuel O. Ogedengbe, Ovoke Oseahweke, Adedotun Adesina, Glenn McRae</i>	

HYBRID POWER/PROPULSION SYSTEMS AND OTHER TOPICS IN TERRESTRIAL ENERGY

A Multidisciplinary Approach to the Evaluation and Selection of Infrastructure Electrification Solutions.....	149
<i>Angel M. Zarate Villazon, Varick Peak, Scott Duncan, Olivia J. Pinon-Fischer, Dimitri N. Mavris</i>	
Powering Policy for Trains with Hybrid Locomotive Consists	167
<i>Michael Yukish, Jay Martin, Gary Stump, Lorri Bennett</i>	
Development of Background-Oriented Schlieren to Investigate Jets in Supersonic Crossflow	178
<i>Michelle Franzen, Marley A. Albright, Christopher W. Dennis, Jonathan McGaunn, Justin Urso, Subith Vasu</i>	
Temperature and Species Measurements in Harsh Environments Using a Laser Spectroscopic Sensor.....	184
<i>Marc B. Etienne, Nishan Khanal, Robert Greene, Justin Urso, Subith Vasu</i>	
High-Pressure Shock Tube Modifications with Application to High Speed Measurements.....	188
<i>Jonathan P. McGaunn, Gabriel Duany Izaguirre, Christopher W. Dennis, Justin Urso, Subith Vasu</i>	

Author Index