Michael P. Burke

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Education

2005-present — Princeton University — Princeton, NJ
Mechanical and Aerospace Engineering
- Major: Combustion and Energy Conversion; Minors: Fluid Mechanics and Mathematics
- GPA: 3.75
- Ph.D. candidate

2001-2005 — The Pennsylvania State University — University Park, PA
Mechanical Engineering
- Schreyer Honors College
- GPA: 3.94
- Graduated with B.S.M.E. with Highest Distinction

Research Experience and Ongoing Projects

Fall 2005 – Present — Profs. Yiguang Ju and Frederick L. Dryer — Princeton University
Development and Validation of Chemical Mechanisms for Coal-Derived Syngas Combustion
- Employed high-speed Schlieren photography to track the propagation of outwardly propagating spherical flames in a high-pressure, pressure-release combustion chamber
- Identified the effect of asymmetric flow field perturbations on flame propagation and flame speed measurement
- Developed correction factor for laminar flame speed determination from spherical flames to account for the actual fluid motions induced by thermal expansion for use in house and by other researchers in the field
- Recorded flame trajectories of combustible mixtures of varied Lewis number to study the role of transient effects on spherical flame propagation and laminar flame speed determination
- Measured flame speeds of $H_2/CO/CO_2$ syngas mixtures at high pressures (up to 20 atm) using spherical flames for use in the development and validation of chemical models of coal-derived synthetic gas combustion

Fall 2004 – Spring 2005 — Prof. Richard A. Yetter — Pennsylvania State University
Senior Honors Thesis Project: Flame Acceleration in Narrow Channels
- Designed and tested experimental apparatus
- Utilized photo diode array for non-intrusive diagnostics of the propagating combustion wave
- Obtained photographs of the flame with short-exposure, high-resolution camera
- Measured the flame propagation speed and identified different flame regimes

Spring 2005 — Prof. Gary S. Settles — Pennsylvania State University
Supersonic Liquid Atomizer Analysis
- Worked in a three-person group to analyze the behavior of a supersonic liquid atomizer
- Gathered Schlieren images of the exit flow from the atomizer
- Interpreted the results through comparison to canonical fluid systems

Summer 2004 — Prof. Richard A. Yetter — Pennsylvania State University
Design and Construction of Equipment
- Designed and constructed a gas bubbler to be used for water vapor calibration of a gas chromatograph
- Designed a portable experiment station (containing gas tanks, flow-regulating systems, measurement systems, ignition systems, and data acquisition systems) for testing of a micro-propulsion thruster

Teaching Experience

Spring 2008 — Princeton University — Princeton, NJ
Assistant in Instruction – MAE 427: Rockets and Air-Breathing Propulsion Technology (under Prof. Yiguang Ju)
- Will prepare and present weekly precepts, provide individual instruction, and grade homeworks

Work Experience

Summer 2002 — Pennoni Associates Inc. — Philadelphia, PA
Intern
- Revised construction plans using AutoCAD
- Assisted in surveying, inspections, and environmental testing

Academic Awards and Recognitions

- Schreyer Honors College Scholarship, Pennsylvania State University, 2001-2005
- Schreyer Honors College Summer Research Grant, Pennsylvania State University, 2004
- Louis Harding Memorial Scholarship for Mechanical Engineering, Pennsylvania State University, 2004-2005
- PHEAA Robert Byrd Scholarship, 2001-2005

Professional Memberships

- The International Combustion Institute, student member
- American Institute for Aeronautics and Astronautics (AIAA), student member

Professional Awards and Recognitions

- Distinguished Paper Award in Detonations, Explosions and Supersonic Combustion (at the Thirty-first International Symposium on Combustion, 2007) – "*The paper in each of the twelve colloquia which is judged to be the most distinguished in quality, achievement, and significance"*

Journal Publications

1. M.P. Burke, Z. Chen, Y. Ju, F.L. Dryer, "On the Determination of Laminar Flame Speed Using Outwardly Propagating Flames: Effect of Cylindrical Confinement", *Combustion and Flame*, Submitted, 2008.
2. Z. Chen, M.P. Burke, Y. Ju, "On the Accurate Determination of Laminar Flame Speed from Expanding Spherical Flames: Effect of Initial Flame Transition", *Proceedings of the Combustion Institute*, Submitted, 2008.
3. Z. Chen, M.P. Burke, Y. Ju, "Effects of compression and stretch on the determination of laminar flame speed using propagating spherical flames", *Combustion Theory and Modelling*, Submitted, 2008.
4. M.-H. Wu, M.P. Burke, S.F. Son, R.A. Yetter , "Flame Acceleration and the Transition to Detonation of Stoichiometric Ethylene/Oxygen in Microscale Tubes", *Proceedings of the Combustion Institute* 31 (2007) 2429–2436.

Conference Papers and Presentations

1. M.P. Burke, Y. Ju, F.L. Dryer, "Effect of Flow Field Perturbations on Laminar Flame Speed Determination Using Spherical Flames", 46th AIAA Aerospace Sciences Meeting and Exhibit, Reno, Nevada, USA, January 2008.
2. Z. Chen, M.P. Burke, Y. Ju, "Effects of Lewis Number on Spherical Flame Transition", 46th AIAA Aerospace Sciences Meeting and Exhibit, Reno, Nevada, USA, January 2008.
3. M.P. Burke, Y. Ju, F.L. Dryer, "Effect of Cylindrical Confinement on the Evolution of Outwardly Propagating Flames," Eastern States Meeting of the Combustion Institute, Charlottesville, Virginia, USA, October 2007.
4. M.P. Burke, X. Qin, Y. Ju, F.L. Dryer, "Measurements of Hydrogen Syngas Flame Speeds at Elevated Pressures," 5th US Combustion Meeting, San Diego, California, USA, March 2007.