2013 FALL TECHNICAL MEETING
EASTERN STATES SECTIONS OF THE COMBUSTION INSTITUTE
Clemson University, South Carolina
October 13-16, 2013

Sunday, October 13, 2013

6:00 – 8:00 **Madren Center Connector and Patio: Registration and Reception**

Monday, October 14, 2013

7:30 **Madren Center Connector:** **Registration**
8:15 **Bell South Auditorium:** **Welcome Remarks/Announcements: W.L. Roberts, KAUST, ESSCI Chair**

Session Chair: **W.L. Roberts**
8:30 **Invited Speaker:** **Daniel C. Haworth, Pennsylvania State University**
Title: ***Toward predictive CFD models for advanced compression-ignition engines: Accounting for unresolved turbulent fluctuations***

	A-1: Turbulent Flames **Bell South Auditorium** **Session Chair: B.M. Cetegen**	**B-1: Diagnostics** **Ballroom C** **Session Chair: M.J. Gollner**	**C-1: Soot** **Seminar Room II** **Session Chair: P.B. Sunderland**
9:40	**A-01 Subgrid-scale mixing of temperature perturbations from flamelet in turbulent partially premixed flames** *S. Liu, C. Tong* *Clemson University*	**B-01 Formaldehyde fluorescence as a marker for scalar dissipation through local extinction** *Kathryn R. Gosselin, William F. Carnell, Jr., Michael W. Renfro* *University of Connecticut*	**C-01 Soot measurements in high-pressure laminar diffusion flames** *S.A. Steinmetz[1], T. Fang[2], W.L. Roberts[1,2]* *[1]KAUST [2]North Carolina State University*
10:00	**A-02 Chemiluminescene imaging of a reacting jet in a vitiated crossflow** *Jason A. Wagner, George M. Lapaan, Michael W. Renfro, Baki M. Cetegen* *University of Connecticut*	**B-02 Development of a LED-based sensor for simultaneous, time-resolved measurements of CO and CO_2 from combustion exhausts** *Kyle Thurmond[1], Emmanuel Duenas[1], Subith S. Vasu[1], William P. Partridge, Jr.[2]* *[1]University of Central Florida* *[2]Oak Ridge National Laboratory*	**C-02 Observations of a hydrocarbon-free soot flame** *Paul M. Anderson, Haiqing Guo, Peter B. Sunderland* *University of Maryland*
10:20	**BREAK – Corridor**		

	A-1: Turbulent Flames (cont.) Session Chair: B.M. Cetegen	B-1: Diagnostics (cont.) Session Chair: M.J. Gollner	C-1: Soot (cont.) Session Chair: P.B. Sunderland
10:50	**A-03 Flame leading point stretch statistics of negative Markstein length fuels** *Andrew Marshall, Prabhakar Venkateswaran, Jerry Seitzman, Tim Lieuwen* *Georgia Institute of Technology*	**B-03 Bench-scale apparatus for studying pool fire extinguishment by Class B foams** *Ramagopal Ananth, Sutton Mott, Majid Waheed, Maximilian Epstein, James M. Smith, Michael W. Conroy, James W. Fleming* *Naval Research Laboratory*	**C-03 Soot formation in butanol isomer non-premixed flames** *Pradeep Singh, Xin Hui, Chih-Jen Sung* *University of Connecticut*
11:10	**A-04 Flame surface statistics of expanding turbulent flame** *Abhishek Saha[1], Swetaprovo Chaudhuri[1,2], Chung K. Law[1]* *[1]Princeton University [2]Indian Institute of Science*	**B-04 Modeling suppression of a liquid pool flame by aqueous foams** *Cedrick Ngalande, James W. Fleming, Ramagopal Ananth* *Naval Research Laboratory*	**C-04 Soot and aromatic species in non-premixed and partially-premixed laminar co-flow flames** *Yefu Wang[1], Suresh S. Iyer[1], Venkatesh R. Iyer[1], Milton J. Linevsky[1], Thomas A. Litzinger[1], Robert J. Santoro[1], Viswanath Katta[2]* *[1]Pennsylvania State University* *[2]Innovative Scientific Solutions Inc.*
11:30	**A-05 An investigation on fuel similarity of turbulent flames for C_4-C_8 *n*-Alkanes** *Fujia Wu, Abhishek Saha, Swetaprovo Chaudhuri, Chung K. Law* *Princeton University*	**B-05 Oxidizer dilution extinguishment of a turbulent Wolfhard-Parker flame** *J.P. White[1], E.D. Link[1], T.M. Myers[1], S.R. Vilfayeau[1], A.W. Marshall[1], P.B. Sunderland[1], A.C. Trouvé[1], J.A. Sheffel[2], M.L. Corn[2], M.B. Colket[2]* *[1]University of Maryland* *[2]United Technologies Research Center*	**C-05 Nanostructure evolution of petroleum based JP-8 and synthetic HRJ, FT derived soot from a gas jet turbine engine** *Chung-Hsuan Huang, Randy L. Vander Wal* *Pennsylvania State University*
11:50	**A-06 Blowoff dynamics of a bluff body stabilized turbulent premixed flame in a cylindrical duct subjected to dual tone velocity oscillation** *Bikram Roychowdhury, Baki M. Cetegen* *University of Connecticut*	**B-06 Numerical simulation of under-ventilated compartment fires** *S. Vilfayeau[1], N. Ren[2], Y. Wang[2], A. Trouvé[1]* *[1]University of Maryland [2]FM Global*	**C-06 Soot nanostructure evolution evolves from variations in flame temperature and fuel/air equivalence ratio** *Chung-Hsuan Huang[1], Jeremy P. Cain[2], Randy L. Vander Wal[1], William M. Roquemore[3]* *[1]Pennsylvania State University* *[2]University of Dayton* *[3]Wright-Patterson Air Force Base*
12:10	**LUNCH – Ballrooms A & B**		
	Bell South Auditorium **Session Chair: A. Trouvé**		
1:30	**Invited Speaker: Yi Wang, FM Global Research** **Title: *CFD modeling of industrial fire protection – progress and challenges***		

	Session A-2: Laminar Flames Bell South Auditorium Session Chair: B.A.V. Bennett	Session B-2: Fire Ballroom C Session Chair: M.J. Gollner	Session C-2: Heterogeneous Combustion Seminar Room II Session Chair: H.K. Chelliah
2:40	**A-07 Experimental and kinetics studies of acetylene flames at elevated pressures** *Xiaobo Shen[1,2], Xueliang Yang[1], Jeffrey Santner[1], Jinhua Sun[2], Yiguang Ju[1]* *[1]Princeton University* *[2]University of Science and Technology of China*	**B-07 Localized heating ahead of flame front in wildland fire spread** *Sharif E. Jamaldin[1], Madison Donoho[1], Justin D. English[2], Brittany A. Adam[2], Nelson K. Akafuah[2]* *[1]Paul Laurence Dunbar High School* *[2]University of Kentucky*	**C-07 Coupled heterogeneous and homogeneous oxidation of heated carbon surfaces simulated using the OpenFOAM computational package** *R.F. Johnson, H.K. Chelliah* *University of Virginia*
3:00	**A-08 Measurement of laminar burning speeds and investigation of stability of acetylene (C_2H_2)/air flames** *Emad Rokni, Ali Moghaddas, Omid Askari, Hameed Metghalchi* *Northeastern University*	**B-08 Thermal and burning rate characteristics of laminar boundary layer diffusion flames** *A.V. Singh, M.J. Gollner* *University of Maryland*	**C-08 A parametric study of reactive wave propagation in nanoporous silicon energetic composites** *Venkata Sharat Parimi, Srinivas A. Tadigadapa, Richard A. Yetter* *Pennsylvania State University*
3:20	**BREAK – Corridor**		
3:50	**A-09 Evaluation of thermal radiation effects on apparent propagation rates of high pressure spherical flames** *J. Santner, F.M. Haas, Y. Ju, F.L. Dryer* *Princeton University*	**B-09 Regional-scale simulations of wildland fire spread using ensemble-based data assimilation** *Mélanie C. Rochoux [1,2,3], Charlotte Emery[1,2,4], Sophie Ricci[1,2], Bénédicte Cuenot[1], Arnaud Trouvé[4]* *[1]CERFACS [2]CNRS [3]Ecole Centrale Paris* *[4]University of Maryland*	**C-09 An investigation into the mechanism for the vapor-phase cracking of eugenol** *Elmer B. Ledesma, Jennifer N. Hoang, Valeria Hernandez, Mitchell Nguyen* *University of St. Thomas*
4:10	**A-10 On the uncertainty of extrapolation of laminar flame speed and Markstein length from expanding spherical flames.** *Fujia Wu[1], Wenkai Liang[1], Chung K. Law[1], Zheng Chen[2]* *[1]Princeton University [2]Peking University*		**C-10 An analysis of transient oxidation of magnetite to hematite in chemical looping combustion** *Tianxiang Li, Fung Liu, Yunging Han, Kunlei Liu, Kozo Saito* *University of Kentucky*
4:45-6:15	**Special Seminar** **Speaker: Paul Aldo** **Topic: *Effective Presentations Skills*** **Bell South Auditorium**		
6:30–8:00	**Reception** **Ballrooms A & B**		

Tuesday, October 15, 2013

8:00-10:00 **Madren Center Connector:** **Registration**
8:15 **Announcements:** **C. Tong**

Session Chair: **C. Tong**
8:30 **Invited Speaker:** **Keith R. McManus, GE Global Research Center**
Title: ***Low-emissions gas turbine combustion: Design trends and challenges***

	Session A-3: Laminar Flames **Bell South Auditorium** **Session Chair: M. Mueller**	**Session B-3: Reaction Kinetics** **Ballroom C** **Session Chair: C.-J. Sung**	**Session C-3: New Technology/ Internal Combustion Engines** **Seminar Room II** **Session Chair: R.S. Miller**
	A-11 MC-Smooth: A mass-conserving, smooth vorticity-velocity formulation for multidimensional flows *S. Cao, B.A.V. Bennett, M.D. Smooke* *Yale University*	**B-11 Non-Boltzmann effects in low-temperature fuel oxidation** *M.P. Burke, C.F. Goldsmith, Y. Georgievskii, S.J. Klippenstein* *Argonne National Laboratory*	**C-11 Perovskite catalysts enhanced combustion on porous media** *Manuel D. Robayo, Ben Beaman, Billy Hughes, Brittany Delose, Nina Orlovskaya, Ruey-Hung Chen* *University of Central Florida*
10:00	**A-12 Local rectangular refinement in three dimensions (LRR3D) with application to unsteady combustion problems** *B.A.V. Bennett, M.D. Smooke* *Yale University*	**B-12 Using reactive molecular dynamics simulations to refine the mechanism of TMEDA combustion** *Craig D. Needham, Phillip R. Westmoreland* *North Carolina State University*	**C-12 Development of a porous combustor for the efficient extraction of thermal energy from liquid and gaseous fuels** *Anthony Carmine Terracciano, Subith S. Vasu, Nina Orlovskaya* *University of Central Florida*
10:20	**BREAK - Corridor**		
10:50	**A-13 Numerical modeling of axi-symmetric laminar diffusion flames with soot** *Adhiraj Dasgupta, Daniel C. Haworth* *Pennsylvania State University*	**B-13 A decomposition study of isopropanol in a variable pressure flow reactor** *J.S. Heyne, F.L. Dryer* *Princeton University*	**C-13 HCCI engine modeling of diisopropyl ketone, a prototypical biofuel** *Ghazal Barari[1], Batikan Koroglu[1], Subith S. Vasu[1], John E. Dec[2], Craig A. Taatjes[2]* *[1]University of Central Florida* *[2]Sandia National Laboratories*
11:10	**A-14 Effects of gravity, radiation, and coflow velocity on laminar coflow methane-air diffusion flames** *S. Cao[1], B.A.V. Bennett[1], B. Ma[1], D. Giassi[1], D.P. Stocker[2], F. Takahashi[2], M.B. Long[1], M.D. Smooke[1]* *[1]Yale University* *[2]NASA Glenn Research Center*	**B-14 A comparative study of methane-air and syn gas premixed flames for NO_x formation** *Atul Joshi, Rajesh Gupta* *M.A.N.I.T.*	**C-14 Kinetics of NO_x formation from $N_2/O_2/C_2H_4$/Ar mixtures in repetitively-pulsed dielectric-barrier discharges** *Kuninori Togai, Nicholas Tsolas, Richard A. Yetter* *Pennsylvania State University*

	Session A-3: Laminar Flames (cont.) Session Chair: M. Mueller	Session B-3 : Reaction Kinetics (cont.) Session Chair: C.-J. Sung	Session C-3: New Technology/ Internal Combustion Engines Session Chair: R.S. Miller
11:30	**A-15 Experimental and computational temperatures in coflow nonpremixed flames** *C.S. McEnally, B.A.V. Bennett, L.D. Pfefferle, M.D. Smooke* *Yale University*	**B-15 A kinetic model for the high-temperature oxidation of *n*-butanol based on recent shock tube/laser absorption experiments** *Subith S. Vasu[1], S. Mani Sarathy[2]* *[1]University of Central Florida [2]KAUST*	**C-15 Prediction of biofuel ignition quality using a DCN↔RON interconversion tool** *F.M. Haas, F.L. Dryer* *Princeton University*
11:50	**A-16 Experimental and computational study of a two-dimensional methyl butanoate flame** *L.A. Kaufman, C.S. McEnally, D.D. Das, L.D. Pfefferle, B.A.V. Bennett, M.D. Smooke* *Yale University*		
12:10	**LUNCH - Ballrooms A & B**		
	Bell South Auditorium **Session Chair: R.A. Yetter**		
1:30	**Invited Speaker: Richard H. West, Northeastern University** **Title: *Building detailed kinetic models of combustion chemistry***		
	Session A-4: Laminar Flames **Bell South Auditorium** **Session Chair: C. McEnally**	**Session B-4: Reaction Kinetics** **Ballroom C** **Session Chair: T. Farouk**	**Session C-4: New Technology** **Seminar Room II** **Session Chair: M. Renfro**
2:40	**A-17 Numerical analysis of extinction limits of counterflow flames: Effects of nozzle diameter and separation distance** *R.F. Johnson, A.C. VanDine, G. Esposito, H.K. Chelliah* *University of Virginia*	**B-17 Water-gas-shift equilibrium in diffusion flames and the effect of non-equilibrium elementary reactions** *Wendong Wu, Richard L. Axelbaum* *Washington University*	**C-17 Supercritical pyrolysis of dodecane with colloidal platinum-decorated graphene sheets** *Hyung Sub Sim[1], Richard A. Yetter[1], Daniel M. Dabbs[2], Ilhan A. Aksay[2]* *[1]Pennsylvania State University [2]Princeton University*
3:00	**A-18 Experimental and numerical studies of ion and electron concentrations in laminar methane-oxygen counterflow diffusion flames** *Parth V. Shah, Alexei V. Saveliev* *North Carolina State University*	**B-18 An analysis of the partial-equilibrium assumption for bimolecular reactions in counter-flow diffusion flames** *Wendong Wu, Richard L. Axelbaum* *Washington University*	**C-18 An integrated approach for the design of a pilot scale oxy-coal combustion reactor using CFD and chemical equilibrium software** *Albio D. Gutiérrez, Steven L. Rowan, Ismail B. Celik* *West Virginia University*
3:20	**BREAK - Corridor**		

	Session A-4: Laminar Flames (cont.) Session Chair: C. McEnally	Session B-4: Reaction Kinetics (cont.) Session Chair: T. Farouk	Session C-4: New Technology (cont.) Session Chair: M. Renfro
3:50	**A-19 An experimental study of fuel decomposition and hydrocarbon growth processes in laminar non-premixed methane air coflow flames doped with seven pentanol isomers** *Dhrubajyoti D. Das, Charles S. McEnally, Lisa D. Pfefferle* *Yale University*	**B-19 Dehydrogenation and dehydration activity in low-temperature gas-phase alcohol pyrolysis** *Patrick J. Fahey, Vikram Seshadri, Phillip R. Westmoreland* *North Carolina State University*	**C-19 Studies of condensed-phase hypergolic reactions in a counter-flow stagnation reactor** *Pulkit Saksena, Srinivas Tadigadapa, Richard A. Yetter* *Pennsylvania State University*
4:10	**A-20 Fuel similarity for laminar flames of C_5 to C_8 *n*-alkanes** *Peng Zhao, Wenkai Liang, Fujia Wu, Chung K. Law* *Princeton University*	**B-20 Non-ideality of flow tube experiments for reaction kinetics** *T. Farouk[1], F.M. Haas[2], F.L. Dryer[2]* *[1]University of South Carolina [2]Princeton University*	**C-20 Improving performance with alkaline doped iron-based materials as oxygen carrier in chemical looping combustion** *Lu Liu, Michael R. Zachariah* *University of Maryland*
4:30	**A-21 Species measurements in a low-pressure, fuel-rich JP-10/H_2 flat flame** *Vikram Seshadri, Wenjun Li, Phillip R. Westmoreland* *North Carolina State University*	**B-21 Novel microflow tube reactor: *n*-butane pyrolysis and oxidation** *U. Shrestha, G.P. Simms, M.J. Rahimi, B.G. Sarnacki, H.K. Chelliah* *University of Virginia*	**C-21 Staged, pressurized oxy-combustion: Computational fluid dynamics simulations of a novel burner design** *Fei Xia, Benjamin M. Kumfer, Bhupesh Dhungel, Richard L. Axelbaum* *Washington University*
4:50	**A-22 An experimental and modeling study of formaldehyde and 1,3,5-trioxane flame chemistry** *Jeffrey S. Santner, Francis M. Haas, Frederick L. Dryer, Yiguang Ju* *Princeton University*	**B-22 A CSP-based analysis of ethylene-air mixing and oxidation in a partially stirred reactor** *G. Esposito, H.K. Chelliah* *University of Virginia*	**C-22 Surrogate fuel evaluation for burner development for non-conventional industrial fuels** *Vijaykant Sadasivuni, Hwan Ho Kim, Chendhil Periasamy* *Air Liquide*
5:20 – 6:30	**ESSCI General Member Meeting** **Bell South Auditorium** ***(All Encouraged to Attend)***		

Wednesday, October 16, 2013

Bell South Auditorium
Session Chair: F.L. Dryer

8:30 **Invited Speaker: Tanvir Farouk, University of South Carolina**
Title: ***Droplet combustion: "Cool Flames" in Space?***

	Session A-5: Laminar Flames **Bell South Auditorium** **Session Chair: G. Esposito**	**Session B-5: Reaction Kinetics** **Ballroom C** **Session Chair: R. West**	**Session C-5: Droplets and Spray** **Seminar Room II** **Session Chair: D.C. Haworth**
9:40	**A-23 Response of over-ventilated non-premixed flames to transverse flow perturbations** *Nicholas Magina, Timothy Lieuwen* *Georgia Institute of Technology*	**B-23 A betweenness centrality method for chemical network analysis and mechanism reduction** *Peng Zhao[1], Samuel M. Nackman[1], Tianfeng Lu[2], Chung K. Law[1]* *[1]Princeton University [2]University of Connecticut*	**C-23 Effectiveness of xenon as fire suppressant under microgravity combustion environment** *M.E.A. Fahd[1], T. Farouk[1], F.L. Dryer[2],* *[1]University of South Carolina [2]Princeton University*
10:00	**A-24 Dynamics and morphology of colliding spherical flames** *Sheng Yang, Swetaprovo Chaudhuri, Delin Zhu, Chung K. Law* *Princeton University*	**B-24 Auto-ignition of *iso*-octane at elevated pressures in a rapid compression machine** *G. Kukkadapu, C.-J. Sung, A.K. Das* *University of Connecticut*	**C-24 Butanol droplet combustion: Detailed numerical modeling and microgravity experiments** *T. Farouk[1], Y.C. Liu[2], M.E.A. Fahd[1], C.T. Avedisian[2], F.L. Dryer[3]* *[1]University of South Carolina [2]Cornell University* *[3]Princeton University*
10:20	**BREAK – Corridor**		
10:50	**A-25 Effect of thermal expansion on flame propagation in channels with nonslip walls: Numerical and analytical consideration** *Berk Demirgok[1], Damir Valiev[2],* *V'yacheslav Akkerman[1]* *[1]West Virginia University [2]Princeton University*	**B-25 Single pulse shock tube study on the effects of double bond position in unsaturated hydrocarbons and fatty acid methyl esters** *Aleksandr Fridlyand[1], S. Scott Goldsborough[1,2], Kenneth Brezinsky[1]* *[1]University of Illinois [2]Argonne National Laboratory*	**C-25 Comparison of spray combustion for jet-A and diesel in a constant volume chamber** *Wei Jing[1], William L. Roberts[1,2], Tiegang Fang[1]* *[1]North Carolina State University [2]KAUST*
11:10	**A-26 Analysis of ethylene-oxygen combustion in micro-pipes** *Berk Demirgok[1], Orlando Jesus Ugarte Almeyda[1],* *V'yacheslav Akkerman[1] Damir Valiev[2],* *Vitaly Bychkov[3] , Ming-Hsun Wu[4]* *[1]West Virginia University [2]Princeton University* *[3]Umea University [4]National Cheng Kung University*	**B-26 Shock tube measurements of the reaction rates of OH with ketones at high temperatures** *Jihad Badra[1], Ahmed Elwardany[1], Fethi Khaled[1],* *Subith S. Vasu[2] , Aamir Farooq[1]* *[1]KAUST [2]University of Central Florida*	**C-26 Oxy-combustion of low-volatility fuel with high water content** *Fei Yi, Richard L. Axelbaum* *Washington University*

	Session A-5: Laminar Flames (cont.) Session Chair: G. Esposito	Session B-5: Reaction Kinetics (cont.) Session Chair: R. West	Session C-5: Droplets and Spray (cont.) Session Chair: D.C. Haworth
11:30	**A-27 Studies on the DC electric field effects on the combustion of fuel droplets** *Solomon Benghan, Tryfon T. Charalampopoulos* *Louisiana State University*		**C-27 A first order approach to modeling fuel incidence angle of an air-blast injector for gas turbine combustion** *Kevin Matiko* *Embry-Riddle Aeronautical University*
11:50	**ADJOURN** **Box Lunch – Corridor** **GE Tour (Depart at 1:30)** **(*Transport bus or car)***		