

**2011 Combustion Institute Canadian Section Spring Technical Meeting
University of Manitoba**



Technical Program



UNIVERSITY
OF MANITOBA

SUNDAY, May 8, 2011

17:00 – 20:00	Registration and Reception – Atrium, EITC Engineering Building
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MONDAY, May 9, 2011

7:30 – 8:00	On-site Registration	
8:00 – 8:20	Welcome & Opening Remarks, Chair: M. Birouk Location: Senate Chamber, EITC, Room E3-262	
8:20 – 9:10	Invited Lecture 1: Professor Janusz Kozinski, Faculty of Science and Engineering, York University; Chair: M. Birouk	
	SESSION A1: Combustion – Modelling & Simulation , Location: EITC Rm. E3-262, Chair: P. Gauthier	SESSION A2: Biomass/Solid Fuels Combustion , Location: EITC Rm. E3-270, Chair: F. Liu
9:30 – 9:50	A1-1: Large-Eddy Simulation of a Turbulent Premixed Bunsen Flame; <i>M. M. Salehi, W. K. Bushe, C.P.T. Groth</i>	A2-1: High-temperature CO ₂ capture with modified CaO-based pellet sorbents; <i>Yinghai Wu, Ian He, Vasilije Manovic, Edward J. Anthony</i>
9:50 – 10:10	A1-2: One-Dimensional Turbulence Formulated PDF Model for Premixed Turbulent Combustion; <i>Hong Tsui, Kendal Bushe</i>	A2-2: Advanced analytical methods in the study of waste combustion: recent advances with in situ synchrotron-based measurements; <i>M.L.Thomas, A.K.Dalai, I.S. Butler and J.A.Kozinski</i>
10:10 – 10:30	A1-3: Implementation of Multiple Mapping Closure (MMC) in LES to model a jet flame in a vitiated coflow; <i>C.B. Devaud, I. Stankovic, B. Merci</i>	A2-3: Metallized Fuels for Ducted Rockets; <i>R.A. Stowe, S.Ringuette, P. Brousseau, C. Dubois, R. Pontes-Limab, B. Esmaeili, O. Maderc, A. Mayer</i>
10:30 – 10:50	BREAK	

	SESSION A3: Combustion – Modelling & Simulation , Location: EITC Rm. E3-262, Chair: K. Bushe	SESSION A4: Soot & Particulates , Location: EITC Rm. E3-270, Chair: G. Ciccarelli
10:50 – 11:10	A3-1: Multi-Scale Adaptive Modelling and Numerical Methods for Reactive Flows; <i>C.P.T. Groth, A. Bourlioux, W. K. Bushe, C. B. Devaud and P. Q. Gauthier</i>	A4-1: An experimental study of the laminar, sooting, coflow diffusion flames of synthetic jet fuels; <i>M. Saffaripour, P. Zabeti, M. Kholghy and M.J. Thomson</i>
11:10 – 11:30	A3-2: Assessment of Pressure-Based RANS Solution Algorithm for Premixed and Non-Premixed Flames; <i>M. R. J. Charest, P. Q. Gauthier, C. P. T. Groth</i>	A4-2: Numerical Analysis of PAH growth mechanisms in a sooting laminar methane-air diffusion flame; <i>V. Chernov, S.B. Dworkin, Q. Zhang, M.J. Thomson</i>
11:30 – 11:50	A3-3: Assessment of Pressure-Based LES Solution Algorithm for Premixed and Non-Premixed Flames; <i>M. R. J. Charest, P. Q. Gauthier, C. P. T. Groth</i>	A4-3: Experimental study of 1-hexanol oxidation in an opposed-flow diffusion flame; <i>C. Yeung, M.J. Thomson</i>
11:50 – 12:10	A3-4: A comparative Study of Subfilter-Scale Models for Large-Eddy Simulation of Turbulent Premixed Flames; <i>M. Van Hove, F. E. Hernández-Pérez, C. P. T. Groth, Ö. L. Gülder</i>	A4-4: Application of a PAH Growth Mechanism to Soot Formation in Laminar Diffusion Flames; <i>S. B. Dworkin, Q. Zhang, M. J. Thomson, N. A. Slavinskaya, U. Riedel</i>
12:10-14:00	Lunch , Location: EITC Rm. E2-229	
12:10-14:00	Board of Directors Meeting , Location: EITC Rm. E2-251	
	SESSION A5: Engines , Location: EITC Rm. E3-262, Chair: L. Kostiuk	SESSION A6: Soot & Particulates , Location: EITC Rm. E3-270, Chair: M. R. Johnson
14:00 – 14:20	A5-1: Effect of Thermal Barrier Coating Surface Finish on Heat Transfer in a SI Engine; <i>Silvio Memme, James S. Wallace</i>	A6-1: Modelling Soot Particle Surface Oxidation in Laminar Flames; <i>S. B. Dworkin, Q. Zhang, M. J. Thomson</i>
14:20 – 14:40	A5-2: Gas Composition Sensors for Biogas Use in IC Engines; <i>Mark Tadrous, James S. Wallace</i>	A6-2: Development of a Numerical Model for Soot Particle Ageing in Laminar Flames; <i>Armin Veshkini, Seth B. Dworkin, Qingan Zhang, Murray J. Thomson</i>
14:40 – 15:00	A5-3: Development of a Diesel Fuel Piloted Syngas Compression Ignition Engine; <i>C. Spaeth, G. Ciccarelli</i>	A6-3: Similarity of pressure dependence of maximum soot yields of alkane gaseous hydrocarbon laminar diffusion flames at high pressures; <i>Ö. L. Gülder, G. Intasopa, H. I. Joo, P. M. Mandatori, D. S. Bento and M. E. Vaillancourt</i>

15:00 – 15:20	A5-4: Multizone Modeling of a Biogas Fuelled HCCI Engine; <i>S. Visakhamoorthy, D. Haggith, A. Sobiesiak and J. Z. Wen</i>	A6-4: Molecular Dynamics Simulation of Accommodation Coefficients for Laser-Induced Incandescence Sizing of Metal Nanoparticles; <i>Kyle J. Daun, Mikko Karttunen, John T. Titantah</i>
15:20 – 15:40	Coffee Break	
	SESSION A7: Engines , Location: EITC Rm. E3-262, Chair: D. Torvi	SESSION A8: Soot & Particulates , Location: Tory Building Rm. 342, Chair: G. Smallwood
15:40 – 16:00	A7-1: Characteristics of Two-phase Fuel Flow in Diesel Injectors: Diesel vs Biodiesel; <i>Kaushik Saha, Ehab Abu-Ramadan, Xianguo Li</i>	A8-1: Numerical Study of DME Addition to Fuel on PAHs and Soot Formation in Laminar Coflow Ethylene/Air Diffusion Flame; <i>Fengshan Liu, Seth Dworkin, M. Thomson, G. J. Smallwood</i>
16:00 – 16:20	A7-2: Numerical Modeling of Urea-Water-Solution Spray and Urea-Related Deposit Formation in Selective Catalytic Reduction System; <i>Liam Bansen, Ehab Abu-Ramadan, Xianguo Li</i>	A8-2: Soot Formation from a Distillation Cut of a Fischer-Tropsch Diesel Fuel: a Shock Tube Study; <i>O. Mathieu, N. Chaumeix, C.-E. Paillard</i>
16:20 – 16:40	A7-3: A Modelling Study on the Effect of Hydrogen Addition on Combustion and Emission Characteristics of an n-Heptane Fuelled HCCI Engine; <i>Hongsheng Guo and W. Stuart Neill</i>	A8-3: Properties of Projected Images of Numerically Generated Soot Fractal Aggregates; <i>Wenhan Liu, Fengshan Liu, David R. Snelling, G. J. Smallwood</i>
16:40 – 17:00	A7-4: Engine Speed Effects on a HCCI Engine Fuelled with Simulated Biomass Gas; <i>D. Haggith, A. Sobiesiak</i>	A8-4: Structure and Sooting Propensity of Biogas and Syngas Fuel Co-Flow Laminar Diffusion Flames at Elevated Pressure; <i>A. Barnwal, A. Barua, M.R.J. Charest, Ö.L. Gülder and C.P.T. Groth</i>
	Annual Business Meeting of the Canadian Section , Location: EITC Rm. E3-262	

TUESDAY, May 10, 2011

8:30 – 9:20	Invited Lecture 2: Professor David Levin, Biosystems Engineering, University of Manitoba, Location: Senate Chamber, EITC Rm. E3-262 Chair: D. Torvi	
	SESSION B1: Combustion – Modelling & Simulation , Location: EITC Rm. E3-262, Chair: C. Groth	SESSION B2: Combustion – Turbulent Flames , Location: EITC Rm. E3-270, Chair: W. Hallett
9:30 – 9:50	B1-1: Development of a computational fluid dynamics model for combustion of fast pyrolysis liquid (bio-oil) combustion; <i>A. McGrath, S. Moloodi, T. Tzanetakis, N. Farra and M.J. Thomson</i>	B2-1: Validity range of flamelet concepts in premixed turbulent combustion; <i>Ömer L. Gülder and Frank T. C. Yuen</i>

9:50 – 10:10	B1-2: Conditional Moment Closure Modeling of Sandia Flame D - Part 1: Assessment of Submodels; <i>A. EL Sayed and R.A. Fraser</i>	B2-2: Effect of Fuel Nozzle Geometry on Co-Flowing Non-Premixed Flame - An Experimental Study; <i>Mohsen Akbarzadeh and Madjid Birouk</i>
10:10 – 10:30	B1-3: Modeling One-Dimensional Turbulent Probability Density Functions; <i>R.W. Derksen</i>	B2-3: Characterization of Blowoff Conditions for a Low-Swirl Burner; <i>Graham E. Ballachey and Matthew R. Johnson</i>
10:30 – 10:50	Coffee Break	
	SESSION B3: Combustion – Modelling & Simulation , Location: EITC Rm. E3-262, Chair: C. Devaud	SESSION B4: Chemical Kinetics , Location: EITC Rm. E3-270, Chair: M. Thomson
10:50 – 11:10	B3-1: An evaluation of numerical models for a flame stabilized in a small tube; <i>G. M. G. Watson, G. P. Gauthier, J. M. Bergthorson</i>	B4-1: Continuous Thermodynamics Modelling of Droplet Ignition; <i>Shaun W. Sabourin, William L.H. Hallett</i>
11:10 – 11:30	B3-2: Conditional Moment Closure Modeling of Sandia Flame D - Part 2: Simulation Results using Consistent Submodels; <i>A. EL Sayed, R.A. Fraser</i>	B4-2: Role of the Lewis Number in Spontaneous Ignition of Hydrogen Jets; <i>Nika Rezaeyan, Luc Bauwens</i>
11:30 – 11:50	B3-3: Numerical investigation of premixed flames stabilized in a narrow duct; <i>G.P. Gauthier, G. Watson and J.M. Bergthorson</i>	B4-3: Thermochemical kinetics: Implications in the development of detailed and reduced chemical kinetic models; <i>B. Akih-Kumgeh and J.M. Bergthorson</i>
11:50 – 12:10	B3-4: Quenching and ignition effects in an idealized nonpremixed combustion model; <i>Pascal Turbis</i>	B4-4: Premixed Laminar Flame Properties of Biogas and Syngas Alternative Fuels as a Function of Composition and Pressure; <i>A. Barnwal, M. R. J. Charest, C. P. T. Groth, Ö. L. Gülder, B. Rehel, and P. Seers</i>
12:10 – 13:30	Lunch , Location: EITC Rm. E2-229	
	SESSION B5: Droplet/Spray Combustion , Location: EITC Rm. E3-262, Chair: O. Gülder	SESSION B6: Fire Studies , Location: EITC Rm. E3-270, Chair: L. Bauwens
13:35 – 13:55	B5-1: Penetration and Mixing of Dual-Hole Transient Gas Jets; <i>Ehsan Faghania, Steve N Rogak</i>	B6-1: Effects of Incident Heat Flux on Cone Calorimeter - Test Results of Polyurethane Foam; <i>L.D. Robson, M.R. Obach, D.A. Torvi, E.J. Weckman</i>

13:55 – 14:15	B5-2: Experimental investigation of n-Heptane Droplet Evaporating in a Turbulent Atmosphere at Elevated Pressure; <i>Sean C. Fabbro, Madjid Birouk</i>	B6-2: Effect of Heat Transfer Mode on the Thermal Performance of Firefighters' Protective Clothing; <i>M. Rezazadeh, D.A. Torvi</i>
14:15 – 14:35	B5-3: Comparative Study of Penetration Depth of Biodiesel and Diesel jets in Gaseous Crossflow; <i>E. Farvardin, M. Johnson, P. Gauthier, A. Dolatabadi</i>	B6-3: Effects of Different Suppression Tactics on the Firefighter and Compartment Environment; <i>M. Obach, E. Weckman, A. Strong</i>
14:35 – 14:55	B5-4: Premixed flame speed study of compounds of kerosene fuel; <i>M.-H. Hakka, R. Brakmann and J.M. Bergthorson</i>	B6-4: Temperature Measurements within a Methanol Pool Fire; <i>Alireza Vali, David S. Nobes and Larry W. Kostiuk</i>
14:55 – 15:25	Coffee Break	
	SESSION B7: Droplet/Spray Combustion , Location: EITC Rm. E3-262, Chair: A. Sobiesiak	SESSION B8: Engines , Location: EITC Rm. E3-270, Chair: J. Wallace
15:25 – 15:45	B7-1: Methyl butanoate and n-heptane as surrogates for the high-temperature combustion of biodiesel and diesel blends; <i>B. Akih-Kumgeh, M.-H. Hakka, M. Johnson, J.M. Bergthorson</i>	B8-1: Ignition timing criteria for partial burn operation in an HCCI engine; <i>A. Ghazimirsaid, M. Shahbakhti, Charles Robert Koch</i>
15:45 – 16:05	B7-2: Effect of cavitation and hydraulic flip on a liquid jets trajectory in subsonic crossflow; <i>B. Nyantekyi-Kwakye, M. Birouk and N. Popplewell</i>	B8-2: Comparison of Butanol/n-Heptane to PRF Blended Fuels in HCCI Engines; <i>Khashayar Ebrahimi, Mahdi Shahbakhti, Charles Robert Koch</i>
16:05 – 16:25	B7-3: A Comparison of the Spray Combustion Characteristics and Emissions of a Wood Derived Fast Pyrolysis Liquid-Ethanol Blend and Diesel in a Pilot Stabilized Swirl Burner; <i>T. Tzanetakis, S. Moloodi, N. Farra, B. Nguyen, A. McGrath and M. J. Thomson</i>	B8-3: Effects of laser versus electrical spark ignition on the flammability limits of CH ₄ -air-CO ₂ mixtures : a comparative study; <i>J. Biet, M. Ndem, M. Idir, N. Chaumeix, I. Gökalp</i>
16:25 – 16:45	B7-4: Development of Research Facility for High Temperature Fuel Spray; <i>Sean Yun and Shaji Manipurath</i>	B8-4: An Experimental Study of Biomass Fast Pyrolysis Liquid (Bio-oil) for Combined Heat and Power Generation using a Stirling Engine; <i>S. Moloodi, U. Khan, B. Nguyen, T. Tzanetakis, N. Farra, M. Zarghami-Tehran, S. Kimb, M. J. Thomson</i>
17:30 SHARP!	Departure by bus from Arthur Mauro Residence, University of Manitoba to the Manitoba Museum	
18:00 – 22:00	Banquet – Visit and Dinner - The Manitoba Museum	

WEDNESDAY, May 11, 2011

8:40 – 9:30	Invited Lecture 3: Dr. Gilles Bourque, Group Leader, Rolls-Royce Canada Location: Senate Chamber, EITC Room E3-262, Chair: M. Birouk	
	SESSION C1: Combustion – Explosion/Detonation , Location: EITC Rm. E3-262, Chair: J. Kozinski	SESSION C2: Soot & Particulates–Diagnostics , Location: EITC Rm. E3-270, Chair: K. Daun
9:40 – 10:00	C1-1: Flammability Limits of H ₂ /air/water mist; <i>J. Goulier, N. Chaumeix, A. Bentaib, C.-E. Paillard</i>	C2-1: Optimum Angles for Multi-angle Elastic Light Scattering Measurements on Soot-Laden Aerosols; <i>D. W. Burr, K. J. Daun, K. A. Thomson & G. J. Smallwood</i>
10:00 – 10:20	C1-2: Shock tube induction time experiments and the constant volume assumption; <i>Josue Melguizo-Gavilanes and Luc Bauwens</i>	C2-2: Applicability of the Wright Polynomial Correction for Time-Resolved Laser-induced Incandescence Measurements in the Transition Regime; <i>S. C. Huberman and K. J. Daun</i>
10:20 – 10:40	C1-3: Detonation Cell Size Data for Dimethyl-ether Air Mixtures; <i>P. Diakow, G. Ciccarelli</i>	C2-3: Influence of Rapid Laser Heating on the Optical Properties of In-Flame Soot; <i>K. A. Thomson, D.R. Snelling, K.-P. Geigle, F. Liu, M. Köhler, G. J. Smallwood</i>
10:40 – 11:00	Coffee Break	
	SESSION C3: Combustion – Turbulent Flames , Location: EITC Rm. E3-262, Chair: A. deChamplain	SESSION C4: Soot & Particulates–Diagnostics , Location: EITC Rm. E3-270, Chair: J. Bergthorson
11:00 – 11:20	C3-1: Experimental measurements of gas and particle phase pollutants, combustion efficiency, and residence time for lab scale flares; <i>J.D. McEwen, K.A. Thomson, and M.R. Johnson</i>	C4-1: Soot emission measurement in flares by sky-LOSA: Correction of the direct sunlight scattering bias with a polarizer; <i>R. W. Devillers, M. R. Johnson, K. A. Thomson</i>
11:20 – 11:40	C3-2: Effect of Fuel Composition on the Response of an Acoustic Forced Flat Flame; <i>Jan Gorski, Wajid Chishty, Matthew Johnson</i>	C4-2: On the reduction of uncertainty in two-dimensional auto-compensating laser-induced incandescence via laser beam shaping; <i>B.M. Crosland, K.A. Thomson and M.R. Johnson</i>
11:40 – 12:00	C3-3: Design Optimization of a 300 KW Methane Furnace; <i>S. Hajitaheri, K. J. Daun</i>	C4-3: Features of an FTIR Gas Analyser; <i>Bernard Paquet and Alain DeChamplain</i>
12:00 – 12:10	Closing Remarks	