Technical Sessions

Tuesday May 14, 2019

08:00 – 08:30	On-site Registration (Arts building third floor)	
08:30 – 08:40	Welcome and Opening Remarks (Arts 366)	
08:40 – 09:30	Plenary Lecture I (Arts 366) "Advancing measurements in reacting flows" **Professor Simone Hochgreb** **The University of Cambridge** Chair: Sina Kheirkhah	
	Arts 366	**Arts 376**
	Topic: **Heterogeneous and Spray Combustion** Chair: Larry Kostiuk	Topic: **Pollutant Formation–1** Chair: Gilles Bourque
09:40 – 10:00	Effects of initial temperature on laminar burning velocity in premixed methane/air counterflow flames *F. Blais, P. Julien, M. McRae, S. Goroshin, and J. M. Bergthorson*	Improved quadrature-based moment closure methods for soot prediction in laminar diffusion flames at atmospheric and elevated pressures *J. Y. Xing and C. P. T. Groth*
10:00 – 10:20	Modes of particle combustion in flat iron stagnation flames on a hot counter flow burner *M. McRae, P. Julien, S. Goroshin, D. L. Frost, and J. M. Bergthorson*	Remote detection of sodium signatures as an indicator of liquid carry-over into flare flames in North Dakota *Z. R. Milani, A. M. Jefferson, and M. R. Johnson*
10:20 – 10:40	Tracking fuel particle fates in a packed bed combustor *E. Wiens, R. Skiffington, and W. L. H. Hallett*	Measuring H_2O and black carbon correlation in turbulent flare plumes and implications for field measurement technologies *S. P. Seymour and M. R. Johnson*
10:40 – 11:00	Coffee Break (Arts third floor foyer)	
	Arts 366	**Arts 376**
	Topic: **IC & Gas Turbine Engine Combustion – 1** Chair: Gaby Ciccarelli	Topic: **Fire Research–1** Chair: Fengshan Liu
11:00 – 11:20	An experimental study on the effect of intake pressure on a natural gas-diesel dual-fuel engine at a low load *S. Dev, H. Guo, and B. Liko*	Multi-physics modeling of FRP composite combustion *J. Langot, M. Lévesque, and E. Robert*

Tuesday May 14, 2019

11:20 – 11:40	Analysis of a change of valve timing on split-cycle engine performance *S. D. Bello and A. Sobiesiak*	Predicting burning rates in multicomponent liquid pool fires *A. Yip, M. J. Pegg, and J. B. Haelssig*
11:40 – 12:00	Diesel engine NOx reduction using a PD-type fuzzy iterative learning control with a fast response NOx sensor *A. Norouzi, M. Aliramezani, and C. R. Koch*	Use of NIR transmission measurements to evaluate in-use performance of firefighters' protective clothing *H. Ohalele, D. Torvi, and S. Noble*
12:00 – 12:20	Effect of injector rail pressure and split injection on natural gas/diesel dual-fuel engine at low load conditions *A. Yousefi, H. Guo, and M. Birouk*	Video analysis of smoke density in full-scale fires *J. Ellingham and E. J. Weckman*
12:20 – 13:40	Lunch on the Arts third floor foyer CICS Board Meeting at Arts 104	
	Arts 366	**Arts 376**
	Topic: **IC & Gas Turbine Engine Combustion – 2** Chair: Nick Eaves	Topic: **Pollutant formation–2** Chair: Seth Dworkin
13:40 – 14:00	Effect of natural gas energy fraction on natural gas/diesel dual-fuel engine under low and high load conditions *A. Yousefi, H. Guo, and M. Birouk*	Soot formation in turbulent swirl stabilized spray flames of jet A-1 blended with 10% ethanol *T. M. Rault and Ö. L. Gülder*
14:00 – 14:20	Extending the load limits of DME in an HCCI/SACI engine *X. Yu, S. LeBlanc, and M. Zheng*	Sooting propensity changes by addition of ethanol to ethylene diffusion flames at elevated pressures *S. Yang and Ö. L. Gülder*
14:20 – 14:40	Flame kernel establishment strategies and its effect on flame propagation process *X. Yu, S. LeBlanc, and M. Zheng*	Effect of sodium chloride on the evolution of size and mixing state of soot particles from a sooting laminar diffusion flame *M. Kazemimanesh, C. Kuang, L. W. Kostiuk, and J. S. Olfert*

Tuesday May 14, 2019

	Arts 366	Arts 376
14:40 – 15:00	Negative valve overlap peak pressure based in-cycle control for HCCI combustion using direct water injection *D. Gordon, C. R. Koch, C. Wouters, B. Lehrheuer, S. Pischinger, M. Wick, and J. Andert*	Exploration of the combustion efficiency and emission indices of a steam co-flow diffusion flame with vertically offset exit planes *M. Zamani, S. Mobaseri, J. S. Olfert, and L. W. Kostiuk*
15:00 – 15:20	Shock-tube combustion of diesel spray and homogeneous methane-air under proto-typical diesel engine conditions *A. C. Merkel and G. Ciccarelli*	Spectrally and temporally resolved LII interference emission in a laminar diffusion flame *S. Musikhin, R. Mansmann, G. J. Smallwood, T. Dreier, K. J. Daun, and C. Schulz*
15:20 – 15:40	Coffee Break (Arts third floor foyer)	
	Arts 366	**Arts 376**
	Topic: **IC & Gas Turbine Engine Combustion – 3** Chair: Kyle Daun	Topic: **Pollutant formation–3** Chair: Murray Thomson
15:40 – 16:00	Experimental study of chamber wall-temperature effect on thermoacoustic oscillations of a small-scale power generator *R. Heydarlaki, W. Aitchison, P. Kostka, and S. Kheirkhah*	Preliminary emission measurements of black carbon, NOx, and organic compounds from a lab scale flare with entrained droplet *O. W. Bello, D. B. Thi, B. Savareear, J. J. Harynuk, L. W. Kostiuk, and J. S. Olfert*
16:00 – 16:20	Effect of partial premixing level on PVC amplitude and acoustics of confined swirling partially premixed flames *M. M. A. Ahmed and M. Birouk*	Preliminary investigation into the effects of turbulent crosswinds on flaring performance *J. Armitage, D. J. Corbin, A. M. Jefferson, G. Kopp, and M. R. Johnson*
16:20 – 16:40	Experimental study of the effect of acoustic dampers on the stability of confined swirling partially premixed flames *M. M. A. Ahmed and M. Birouk*	Quantifying the effect of kinetic uncertainties on NO predictions at engine-relevant pressures in premixed methane-air flames *A. Durocher, G. Bourque, and J. M. Bergthorson*
16:40 – 17:00	A control orientated diesel engine NOx emission model for on board diagnostics and engine control with sensor feedback *M. Aliramezani, A. Norouzi, C. R. Koch, and R. E. Hayes*	Spectral mass absorption cross section of soot from gas flares: Evidence of variability and development of a phenomenological model *B. M. Conrad and M. R. Johnson*

Tuesday May 14, 2019

17:00 – 17:20	A machine learning modeling approach for HPDI dual fuel CNG engines *M. Karpinski-Leydier, R. Nagamune, and P. Kirchen*	Soot particle concentration estimator applied to a transient turbulent non-premixed jet flame *L. Zimmer, S. B. Dworkin, A. Attili, H. Pitsch, and F. Bisetti*
17:20 – 17:40	Study of ignition in a direct injected, compression ignition natural gas engine with modified hot surfaces *M. A. Ali and J. S. Wallace*	Quantifying benzene destruction efficiency in lab-scale flares *N. T. Brooker, B. M. Crosland, and M. R. Johnson*
18:45 – 22:00	Okanagan Lake cruise (Buses depart at 18:45 from parking lot G)	

Wednesday May 15, 2019

	Arts 366	Arts 376
08:30 – 9:00	On-site Registration (Arts building third floor)	
09:00 – 09:50	Plenary Lecture II (Arts 366) "What have we learned from high pressure soot studies – on track to finding a soothing solution or falling into a black hole?" **Professor Ömer Gülder** **University of Toronto, Institute for Aerospace Studies** Chair: Clinton Groth	
	Arts 366	**Arts 376**
	Topic: **Detonation, Explosion, and Supersonic Combustion** Chair: Cecile Devaud	Topic: **Laminar Flames** Chair: Patrick Kirchen
10:00 – 10:20	On reconsideration of the method for calculating oxygen balance of propellant oxidizers *Y. T. Rajan, A. Chowdhury, N. Kumbhakarna, P. Ahirwar, and I. Namboothiri*	Actuation of premixed stagnation flame by nanosecond pulsed plasma at atmospheric pressure *J. Lambert, S. Coulombe, G. Bourque, and J. M. Bergthorson*
10:20 – 10:40	Detonation propagation in a linearized representation of a rotating detonation engine *C. D. Metrow and G. Ciccarelli*	Maximum Entropy inspired interpolative moment closure for non-gray radiative heat transfer in laminar diffusion flames *J. A. R. Sarr, C. P. T. Groth, and J. T. C. Hu*
10:40 – 11:00	Coffee Break (Arts third foyer)	
11:00 – 12:20	Panel Discussion (Arts 366) Every new car sold in 2040 will be zero-emission **Panellists:** **Andrzej Sobiesiak, Seth Dworkin,** **Patrick Kirchen, and Hongsheng Guo** Moderator: Jeff Bergthorson	
12:20 – 13:40	Lunch on the Arts third floor foyer	
	Arts 366	**Arts 376**
	Topic: **Pollutant Formation – 4** Chair: William Hallett	Topic: **Turbulent Flames–1** Chair: Jeff Bergthorson
13:40 – 14:00	Analysis of the products and kinetic rates of methane thermal decomposition. Part I: Experimental apparatus *J. Tatum, A. Punia, M. Secanell, L. W. Kostiuk, and J. S. Olfert*	Non-flamelet behavior of hydrogen-enriched methane-air turbulent premixed flames *S. Mohammadnejad, P. Vena, S. Yun, and S. Kheirkhah*

Wednesday May 15, 2019

	Arts 366	Arts 376
14:00 – 14:20	Carbon conversion efficiency and emission indices from a lab-scale flare with air or steam assist *H. Ahsan, A. Ahsan, J. S. Olfert, and L. W. Kostiuk*	Towards quantifying the propensities of stable hydrogen-enriched methane-air turbulent premixed flames to blow-out and flash-back *S. Mohammadnejad, P. Vena, S. Yun, and S. Kheirkhah*
14:20 – 14:40	The effect of inorganic salts from flowback operations on the size, effective density, mixing state, and optical properties of soot from gas flares *U. Trivanovic, A. Baldelli, M. Kazemimanesh, B. M. Conrad, A. M. Jefferson, J. C. Corbin, M. R. Johnson, J. S. Olfert, and S. N. Rogak*	Application of the uniform conditional state model to turbulent non-premixed combustion *G. R. Hendra and W. K. Bushe*
14:40 – 15:00	The effect of hydrogen substitution on the real world NOx and PM emissions of a heavy-duty diesel truck *J. D. Meiklejohn, P. Kirchen, S. N. Rogak*	First application of UCS as a predictive model for burner simulation *S. De Graaf, L. de Guillebon, M. Konle, G. Hendra, and W. K. Bushe*
15:00 – 15:20	Coffee Break (Arts third foyer)	
	Topic: **New Technology Concepts** Chair: Patrizio Vena	Topic: **Fire Research–2** Chair: Hongsheng Guo
15:20 – 15:40	3D numerical study of a porous burner based on a diamond lattice geometry *P.-L. Billerot, L. Dufresne, and P. Seers*	Effect of apparatus configuration on gaseous fire whirl dynamics *M. T. Diab, J. B. Haelssig, and M. J. Pegg*
15:40 – 16:00	Analysis of the products and kinetic rates of methane thermal decomposition. Part II: Numerical models *A. Punia, J. Tatum, J. Olfert, L. Kostiuk, and M. Secanell*	Incipient fire characterization and learning algorithms for fire state determination *N. L. Ryder and E. J. Weckman*
16:00 – 16:20	Annual Business Meeting (Arts 366)	
18:00 – 21:00	Conference Banquet at the **University Center 200- Ballroom (UNC 200)**	

Thursday May 16, 2019

	Arts 366	Arts 376
	Topic: **Turbulent Flames–2** Chair: Qiang An	Topic: **Diagnostics–1** Chair: Bob Koch
09:00 – 09:20	Flow topologies of reactive jet in turbulent flow at low velocity ratios *M. M. Hossain, D. Corbin, and G. A. Kopp*	Temperature and pressure correction of wavelength modulation spectroscopy concentration measurements *M. Yeremi, D. E. Sommer, J. Son, P. Kirchen, and S. N. Rogak*
09:20 – 09:40	Assessment of conditional source-term estimating for high pressure turbulent combustion modeling *C. Devaud, W. K. Bushe, and J. Bellan*	Inversion of tandem CPMA-DMA measurements to determine the two-dimensional mass-mobility distribution of soot *T. A. Sipkens, S. N. Rogak, and J. S. Olfert*
09:40 – 10:00	Coffee Break (Arts third floor foyer)	
	Topic: **Turbulent Flames–3** Chair: Zekai Hong	Topic: **Diagnostics–2** Chair: Timothy Sipkens
10:00 – 10:20	Large Eddy Simulations of Sandia flames D, E and F using doubly conditional source-term estimation *M. Mortada and C. B. Devaud*	Optical inference of flare combustion efficiency using thermochemical manifold reduction *R. B. Miguel, K. J. Daun, and J. Emmert*
10:20 – 10:40	Probability density function modelling in uniform conditional state simulation of turbulent flames *S. R. Taylor, G. R. Hendra, and W. K. Bushe*	The effect of primary particles polydispersity and effective density on radiative properties of soot aggregates *K. Babaee, T. A. Sipkens, and S. N. Rogak*
10:40 – 11:00	The effect of changing the lower heating value on the overall carbon conversion efficiency on an air co-flow diffusion flame *S. Mobaseri, J. S. Olfert, and L. W. Kostiuk*	Influence of aggregate size on the modeling of laser-induced incandescence of soot formed in a turbulent diffusion of Diesel *S. Menanteau and R. Lemaire*
11:00 – 11:20	Turbulence flame interaction in hydrogen-air premixed flames *J. Lai and D. Patel*	The effect of nanparticle charge on laser-induced incandescence measurements of metallic nanoparticles *S. T. Moghaddam, S. Robinson-Enebeli, D. J. Clavel, G. J. Smallwood, A. Klinkova, and K. J. Daun*

Thursday May 16, 2019 (Soot and Premixed Flame Workshop*)

11:40 – 12:50	Lunch (Arts third floor foyer)
	Soot and premixed flame workshop (Arts 366) Chair: Patrizio Vena
	Soot
12:50 – 13:10	On the application of moment closures for soot modelling in laminar flames *Jacques Xing*
13:10 – 13:30	Measurements and modeling of laminar coflow propane and ethylene diffusion flames at different oxygen indices *Fengshan Liu*
13:30 – 13:50	**Questions and discussions**
13:50 – 14:10	Progress on global emission problems enabled by past insights *Matthew Johnson*
14:10 – 14:30	3-dimensional models of soot aggregates from electron tomography *Steven Rogak*
14:30 – 14:50	**Questions and discussions**
14:50 – 15:10	Coffee break (Arts third floor foyer)
	Premixed flame
15:10 – 15:30	Regimes of premixed turbulent spontaneous ignition and deflagration under gas-turbine reheat combustion conditions. *Bruno Savard*
15:30 – 15:50	Modelling premixed turbulent combustion: the flamelet method and its shortcomings *Cecile Devaud*
15:50 – 16:10	Conditional Source-term Estimation for modelling premixed turbulent combustion *Kendal Bushe*
16:10 – 16:30	**Questions and discussions**
16:30 – 16:50	Burning rates and flame surface area in premixed turbulent combustion *Larry Kostiuk*
16:50 – 17:10	Un-answered questions of turbulent premixed combustion: What we have learnt and What needs to be done *Sina Kheirkhah*
17:10 – 17:30	**Questions and discussions**

*Please note that our workshop seats are limited to the registered guests.