University of Windsor — CFD2017 — Société canadienne de / CFD / Society of Canada

25th Annual CFDSC Conference
June 18 - June 20

Scientific Program

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Windsor, June 18, 2017

Dear members of the CFD Society of Canada,

It is an honour to welcome you to our 25th Annual Conference in Windsor, ON. This important anniversary of our Society is a testament to the hard work and dedication of all its members and leaders throughout the years. The founders, the Board Members and Presidents, some of which will be joining us at the celebration banquet, steered the Society forward, adapting it to new challenges and demands. The members and many corporate supporters actively participated in and supported the initiatives and events of the CFDSC. As a result, we can look back at an uninterrupted sequence of successful Annual Conferences that took place all over Canada and, after 15 years, returns to beautiful Windsor.

In the past year the Society has consolidated its new Bylaws, in accordance with the Corporations Act. As a result, we introduced the new category of Corporate Membership with voting rights, in addition to the Individual and Student Membership categories, which will be more formalized in the coming year.

After a painful transition from the previous website management system, our Student Board Members are now maintaining a revamped website and bringing it up-to-date. Make sure you check out **cfdcanada.ca**. Speaking of students, our enhanced recognition and support, since 2014, offers up to two Scholarship Awards of $4,000, two Best Paper Awards and up to 10 Travel Awards to attend the Annual Conference. We encourage all students to apply.

I wish you all a wonderful Conference. Happy 25th Anniversary!

Carlos F. Lange, Ph.D., P.Eng.
President
CFD Society of Canada

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Message from the Chair of the CFD2017 Organizing Committee

Dear CFD2017 Delegates,

The University of Windsor is proud to host the 2017 CFD Society of Canada (CFDSC) annual conference, on the 25th anniversary of its founding.

The Annual Conference is designed to promote collaborative research by bringing together CFD experts from academic, government and industry to discuss current and future issues in the development and application of CFD. We have all witnessed the huge advances in CFD technology and computing power that have made CFD an attractive analysis and design tool for many industries.

CFD and CFDSC have come a long way in the last 25 years. The internet had gotten off the ground by 1969, but relative to its impact today, it was still in its infancy in 1992. Cell phones, first marketed in 1983 (at a whopping price of $3,995) where still large hand-held devices weighing more than today's laptops. We used large workstations and mainframes for our scientific computing. Compared to what's available today, commercial software was rather rudimentary, particularly in the way we interfaced with the computer, with limited GUIs and slow processing of large data sets. And, at that time, there were only about two dozen different turbulence models!

A couple of years ago I had the pleasure of attending a heat transfer conference honouring Prof. Brian Spalding and Prof. Suhas Patankar, two giants in CFD. They delivered interesting and entertaining lectures about their experiences and the path that led to the finite volume method. But, there were two especially provocative comments, which I think were right on the money. Prof. Patankar remarked that, given the enormous capacity we now have in computational speed and big data storage, maybe it is now time to go back to simpler explicit time marching schemes like explicit Euler. Having to take very small timesteps is not really a problem anymore. Then, in his talk, Prof. Spalding said something that really struck me. He told the audience that we have to learn how to run our CFD simulations on our cell phones! This came from a 90+ year old gentleman, a true visionary right up to his recent passing in 2016.

This is the primary purpose of attending conferences, to open your mind to the seemingly impossible, to get your creative juices flowing, to question what may seem obvious to others, to discuss, debate and argue, to develop a network of friends and fellow researchers of like mind, to take food and drink together, to push yourself and each other to achieve excellence. One of the unique features of the annual CFDSC conferences is the participation of students, and this year is no exception. About two-thirds of the attendees are students. I hope that CFD2017 will motivate you to continue to work hard and strive for excellence, but also have some fun doing it.

On behalf of the Organizing Committee, I wish you all the best and hope you have a great experience at CFD2017.

Sincerely,
Ron Barron
Chair, CFD2017

CFD2017 Organizing Committee

- Ron Barron, Chair

- Gary Rankin, Education Session Organizer

- Ram Balachandar, Student Paper Competition

- Jeff Defoe, Technical Review Chair

- Vesselina Roussinova, Volunteers Coordinator

- Owais Iqbal, Review Committee

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Plenary Speakers

Dr. Vincent H. Chu

Dr. Chu received his PhD degree from MIT. He is Professor and Director of the Fluids and Hydraulics Laboratory at McGill University in Montreal, Quebec, and holds the designation of Professional Engineer of Quebec.

Title: Capturing Discontinuities in Computational Fluid Dynamics

Abstract: Numerical simulation increasingly has played a greater role in teaching, in basic research and in the planning and design of infrastructure. This lecture will discuss the numerical methods contrasting the Eulerian formulation versus the Lagrangian formulation. A large number of simulation examples of gravity currents and its interaction with waves will be presented to show how numerical simulation has become necessary in modern engineering design and how it has become an indispensable tool to teaching and research the fundamentals.

Dr. Kumar Srinivasan

Dr. Srinivasan is the Manager of Vehicle CFD Group at Chrysler Group LLC, responsible for simulations to support aero/acoustic development, cooling/thermal management and HVAC systems design. He has over 20 years of experience in application of simulation tools in the automotive industry and over 25 papers in various aspects of simulation technology. He is the recipient of two FCA Innovation Awards for advancement in technology. He has been a member of the SAE Thermal Systems committee for the past 14 years and served as its Chairman from 2011-2013. Kumar holds a doctoral degree in Aerospace Engineering from the University of Cincinnati.

Title: Vehicle Aerodynamics and Thermal Management CFD Overview

Nikolay Sakharnykh

Nikolay Sakharnykh is graduate of the Department of Computational Mathematics and Cybernetics at Moscow State University, now employed as a senior developer technology engineer at NVIDIA, where he works on accelerating HPC and data analytics applications on GPUs. He joined NVIDIA in 2008 as a graphics engineer working on making video games run faster and enabling new visual effects. At the same time, CUDA started to pick up, and he got excited about the general compute capabilities of the GPUs. Now he's exploring GPU applications for graph and data analytics and new memory management techniques.

Title: High Performance Multigrid with GPU Acceleration

Abstract: Multigrid methods can be differentiated into more general algebraic multigrid (AMG) and the specialized geometric multigrid (GMG). AMG is a perfect "black-box" solver for problems with unstructured meshes and can be easily accelerated with GPUs using the NVIDIA AmgX library. On the other hand, GMG methods are more efficient than AMG on structured problems and usually require custom implementations. Multigrid methods naturally expose various degrees of parallelism going through the hierarchy of multigrid levels. The fine levels have lots of grid points and run well on throughput-oriented parallel architectures like the GPU, while the coarse levels are better suited for latency-optimized processors like CPUs. Thus, for optimal performance, a hybrid scheme is required to guarantee that each level is executed on the suitable architecture. We will introduce a novel hybrid CPU/GPU implementation for GMG, discuss performance portability aspects, deep dive into memory management and key performance optimizations for the GPU. The analysis is based on a well-known high-performance multigrid benchmark (HPGMG).

Dr. Markus Rumpfkeil

Dr. Rumpfkeil is an Associate Professor in the Department of Mechanical and Aerospace Engineering at University of Dayton, Ohio, USA. He completed his PhD under the supervision of Dr. D. Zingg at the University of Toronto Institute for Aerospace Studies (UTIAS) and worked with Dr. D. Mavriplis as a Postdoctoral Fellow at the University of Wyoming. He has authored or co-authored 50 journal and conference papers in the area of CFD. In particular, he is a co-author of "A Best Practices Report on CFD Education in the Undergraduate Curriculum", published in the International Journal of Aerodynamics in 2014.

Title: CFD in Undergraduate Engineering Education

Abstract: This talk will highlight some best practices on how to incorporate computational fluid dynamics (CFD) instructional content in undergraduate aerospace and mechanical engineering curricula. The basis for this presentation comes from a working group of the AIAA Fluid Dynamics Technical Committee which addressed the growing need for engineers to become "intelligent users" of CFD; that is, to be able to obtain a solution of a fluid flow, and to critically assess the quality of the results. The concepts of CFD will be distilled into curricular elements; and reasonable expected learning outcomes for undergraduate- level instruction will be outlined. Some case studies of existing CFD courses will be presented in a hierarchy of various "profiles" - from CFD light to CFD heavy - for inclusion in courses with lecture, laboratory, or design formats.

SUNDAY PM - June 18, 2017

16:00 to 19:00	Registration	CEI Main Entrance Atrium (Lobby)	
18:00 to 20:00	Welcome Reception		CEI 3rd Floor Terrace

CEI = Centre for Engineering Innovation

MONDAY AM - June 19, 2017

7:45	Breakfast & Registration	CEI Lobby	Registration Desk will be open throughout the Conference	
8:45	Opening Remarks	CEI 1100	M. Saif, I. Sliskovic, C. Lange, R. Barron	
9:00	Plenary Lecture	CEI 1100	V.H. Chu	Capturing Discontinuities in
10:00	Coffee	CEI Lobby		Computational Fluid Dynamics

	Session A1	Session A2	Session A3	Session A4
	CIVIL / ENVIRONMENTAL	HEAT TRANSFER	MULTIPHASE/SPRAYS/BUBBLES	AEROSPACE / AERODYNAMICS
	Room: 2104 CEI	Room: 2103 CEI	Room: 2102 CEI	Room: 2101 CEI
	CHAIR: V. H. Chu	CHAIR: B.-C. Wang	CHAIR: C. Groth	CHAIR: H. Yang
10:30 to 10:50	Numerical Study of the Effects of Inlet Boundary Conditions on Gas-Solids Flows in Circulating Fluidized Bed Risers **CFD2017-217** Sun, Z., Zhang, C., Zhu, J. Western U, London, Canada	Numerical Study of the Convective Heat Transfer from the Inner Surface of Recessed Non-Rectangular Window **CFD2017-314** Oosthuizen, P., Rahmatmand, A. Queen's U, Kingston, Canada	Vorticity Criterion for the Entrainment of Multi-Plume Sprays **CFD2017-316** Ghasemi, A., Li, X. U Waterloo, Waterloo, Canada	Unsteady RANS Analysis on the Oscillation of Stall Cells over a NACA 0012 Aerofoil **CFD2017-109** Liu, D., Delafin, P.-L., Nishino, T. Cranfield U, Cranfield, U.K.
10:50 to 11:10	Numerical Simulation of the Liquid-Solid Two Phase Flows in Circulating Fluidized Beds **CFD2017-216** [1] Luo, H., [1] Zhang, C., [2] Zhu, J. Western U, London, Canada	Natural Convective Heat Transfer from a Heated Upward Facing Recessed Isothermal Horizontal Two-Dimensional Surface with and without Heated Side Walls **CFD2017-317** Oosthuizen, P. Queen's U, Kingston, Canada	Evaluation of an Eulerian-Lagrangian Spray Atomization (ELSA) Model for Nozzle Flow: Modeling of Coupling Between Dense and Disperse Regions **CFD2017-108** [1] Leung, T., [1] Groth, C., [2] Hu, J. [1] UTIAS, U Toronto, Toronto, Canada; [2] Pratt & Whitney, Mississauga, Canada	An Efficient Mutation Strategy for Inverse Design of Airfoil Shape Optimization with Genetic Algorithm **CFD2017-106** Timnak, N., Jahangirian, A. Amirkabir U of Technology, Tehran, Iran
11:10 to 11:30	An Optimized A-Stable SSP Runge-Kutta IMEX Scheme for Atmospheric Applications **CFD2017-415** Rokhzadi, A., Mohammadian, A. U Ottawa, Ottawa, Canada	Dynamic Phase Coupling of Heat and Mass Transfer in Porous Media: An Unstructured CFD Framework **CFD2017-409** Elhalwagy, M., Straatman, A. Western U, London, Canada	CFD Modelling of Hydrodynamics in Bubble Column Equipped with Internals **CFD2017-211** Gaurav, T., Prakash, A., Zhang, C. Western U, London, Canada	Optimum Morphing Airfoil Design Using Evolutionary Algorithm and CFD Solver **CFD2017-107** Jahangirian, A., Nemati, M. Amirkabir U of Technology, Tehran, Iran
11:30 to 11:50	Effects of Blade Pitch Angle on Aerodynamic Characteristics of a Small-Scale Darrieus Vertical Axis Wind Turbine with Straight Blades (H-type VAWT) **CFD2017-209** Abdalrahman, G., Lien, F.-S., Melek, W. U Waterloo, Waterloo, Canada	Effects of Grid Size in Low Pressure Sub-cooled Flow Boiling **CFD2017-333** Fukuda, K., Iqbal, O., Barron, R., Balachandar, R. U Windsor, Windsor, Canada	Novel Models for Multi-Phase Particle Flows Coupled to a Background Gas **CFD2017-305** Forgues, F., Ben Dhia, Z., McDonald, J. U Ottawa, Ottawa, Canada	An Investigation into Multi-Point Compressor Blade Design for Operation in Distorted Flow **CFD2017-103** Younkie, M., Defoe, J. U Windsor, Windsor, Canada
11:50 to 12:10	Continued Development of An Advanced Wind Turbine Actuator Line Model **CFD2017-201** O'Dea, M., Guessous, L. Oakland U, Rochester, USA	Conjugate Effect on the Heat Transfer Coefficient **CFD2017-327** Nasif, G., Barron, R., Balachandar, R. U Windsor, Windsor, Canada	The Effect of Incoming-Air Angle Influences on Soot Emission **CFD2017-110** [1] Darbandi, M., [1] Ghafourizadeh, M., [2] Schneider, G. [1] Sharif U of Technology, Tehran, Iran [2] U Waterloo, Waterloo, Canada	The Influence of Rotor-Stator Axial Gap on the Unsteady 3D Flow Field in a Single Stage Axial Compressor **CFD2017-112** Ali, S., Savory, E., Zhang, C. Western U, London, Canada
12:10 to 12:30	Effects of Surface Roughness on Aerodynamic Performance of Horizontal Axis Wind Turbines **CFD2017-337** [1,2] Bouhelal, A., [1] Smaili, A., [2] Masson, C., [3] Guerri, O. [1] ENP, Alger, Algeria; [2] ETS, Montreal, Canada; [3] Centre de Dév. Énergies Ren., Alger, Algeria	An Air Cooled Thermal Management System for Lithium-Ion Battery under Electric Vehicle Driving Cycles **CFD2017-322** [1] Bahiraei, F., [1] Fartaj, A., [2] Nazri, G.-A. [1] U Windsor, Windsor, Canada; [2] Wayne State U, Detroit, USA	Comparing Eulerian and Lagrangian Approaches for Modeling Multiphase Flow Through Venturi-Scrubbers **CFD2017-330** [1] Darbandi, M., [1] Ashrafi-Habibabadi, A., [1] Barezban,M.-B., [2] Schneider, G. [1] Sharif U of Technology, Tehran, Iran [2] U Waterloo, Waterloo, Canada	Towards Accurate Simulation of Aircraft High-Lift Droplet Impingement using Eulerian Approach **CFD2017-111** [1] Bourgault-Côté, S., [2] Yang, H., [2] Vafa, S. [1] Laurendeau, E. [1] Polytechnique Montréal, Montréal, Canada [2] Bombardier Aerospace, Dorval, Canada

12:30 to 14:00	LUNCH	CEI 1100		

MONDAY PM - June 19, 2017

14:00	**Plenary Lecture**	**CEI 1100**	**N. Sakharnykh**	**High Performance Multigrid**
15:00	**Coffee**	**CEI Lobby**		**with GPU Acceleration**
	Session B1 CIVIL / ENVIRONMENTAL **Room: 2104 CEI** CHAIR: M. Brelski	Session B2 MESH / GRID **Room: 2103 CEI** CHAIR: P. Oosthuizen	Session B3 APPLICATIONS **Room: 2102 CEI** CHAIR: C. Lange	Session B4 METHODS **Room: 2101 CEI** CHAIR: C. Zhang
15:20 to 15:40	Numerical Study of the Impact of Multi-Layering on the Permeability and Capture Efficiency of Fibrous Air Filters **CFD2017-309** [1] Tucny,J-M., [1] Vidal, D., [2] Drolet, F., [1] Bertrand, F. [1] Polytechnique Montréal, Montréal, Canada; [2] FPInnovations, Pointe-Claire, Canada	A Unified Finite Difference Scheme for CFD Simulations: From Cartesian Mesh to Meshless **CFD2017-420** Barron, R., Ostoic, S., Smith, A., Elmizari, M. U Windsor, Windsor, Canada	Numerical Simulation of Gas Respiration in Produce Processing and Storage Applications **CFD2017-307** Elhalwagy, M., Dyck, N., Straatman, A. Western U, London, Canada	A CELESTE Based Curvature Reconstruction Method for Simulation of Contact Lines on Immersed Boundaries **CFD2017-403** O'Brien, A., Bussmann, M. U Toronto, Toronto, Canada
15:40 to 16:00	Kelvin-Helmholtz Mixing in Gravity-Current Head **CFD2017-206** Chu, V., Altai, W. McGill U, Montreal, Canada	Efficiency Enhancement of an Unstructured CFD Solver with Grid Renumbering and Code Optimization **CFD2017-406** Yang, H., Castonguay, P., Raiesi, H. Bombardier Aerospace, Dorval, Canada	CFD Expert System for Steam Simulation **CFD2017-417** Li, L., Ma, Y., Lange, C. U Alberta, Edmonton, Canada	A Low-Mach-Number Preconditioner for the Ten-Moment, Gaussian Moment Closure of Gas Dynamics **CFD2017-401** Giroux, F., McDonald, J. U Ottawa, Ottawa, Canada
16:00 to 16:20	Flood Wave Force on Infrastructure **CFD2017-205** Xie, P., Chu, V. McGill U, Montreal, Canada	Anisotropic Block-Based Adaptive Mesh Refinement with Adjoint-Based Error Estimation for Three-Dimensional Inviscid Flows **CFD2017-402** Ngigi, C., Freret, L., Groth, C. UTIAS, U Toronto, Toronto, Canada	A Simple Hybrid Numerical Model of a Supersonic Fluidic Oscillator **CFD2017-334** Xu, S., Martins, J.-P., Rankin, G. U Windsor, Windsor, Canada	Recent Progress Towards Next-Generation Computational Aerodynamics: High-Order Flux Reconstruction at Petascale **CFD2017-413** Vermeire, B. Concordia U, Montreal, Canada
16:20 to 16:40	CFD Simulation of Air-Water Dynamics in the Raiser of an Underwater Compressed Air Energy Storage System **CFD2017-208** [1] Ebrahimi, M., [2] McGillis, A., [1] Ting, D.S.-K., [1] Carriveau, R. [1] U Windsor, Windsor, Canada [2] Hydrostor, Toronto, Canada	Block-Based Anisotropic AMR with *A Posteriori* Adjoint-Based Error Estimation for Three-Dimensional Inviscid and Viscous Flows **CFD2017-412** Narechania, N., Freret, L., Groth, C. UTIAS, U Toronto, Toronto, Canada	A First Principles-Based and Numerical Design Approach for Fluid Flow Systems with Application to an Open-Loop Wind Tunnel **CFD2017-304** Ramrukheea, K., Defoe, J. U Windsor, Windsor, Canada	Edge -Based FEM of Electromagnetic Effects in Hypersonic Flows **CFD2017-408** [1]Zhang, W., [1]Habashi, W., [2]Ben Salah, N., [3]Fossati, M., [4]Isola, D., [4]Baruzzi, G. [1] McGill U, Montreal, Canada; [2] U Tunis, Tunis, Tunisia; [3] U Strathclyde, Glasgow, UK; [4] ANSYS Inc., Montreal, Canada
16:40 to 17:00	Numerical Simulation of Impulse Waves Generated by Landslide **CFD2017-212** [1] Li, H., [1] Chen, Z., [1] Jin, Y.-C., [2] Tai, Y.-C. [1] U Regina, Regina, Canada; [2] National Cheng Kung U, Tainan, Taiwan	A Mesh-less Method for Viscous Flow Simulation **CFD2017-419** Namvar, M., Jahangirian, A. Amirkabir U of Technology, Tehran, Iran	CFD-DEM Investigation of Seed Clustering in an Air Seeder with the Immersed Boundary Method **CFD2017-332** Bayati, M., Johnston, C. Radix Innovation Corporation, Grande Prairie, Canada	High-Order Finite-Volume Scheme with Anisotropic Adaptive Mesh Refinement: Efficient Inexact Newton Method for Steady Three-Dimensional Flows **CFD2017-414** [1] Freret, L., [1] Groth, C., [2] Nguyen, T., [2] De Sterck, H. [1] UTIAS, U Toronto, Toronto, Canada; [2] Monash U, Melbourne, Australia
17:30 to 19:00	**CFDSC BOD Meeting**	**CEI 3000**		

TUESDAY AM - June 20, 2017

7:45	Breakfast & Registration	CEI Lobby	Registration Desk will be open throughout the Conference	
8:45	Updates	CEI 1100		
9:00	Plenary Lecture	CEI 1100	K. Srinivasan	ehicle Aerodynamics and Thermal
10:00	Coffee	CEI Lobby		Management CFD Overview

	Session C1	Session C2	Session C3	Session C4
	TURBULENCE MODELLING	**HEAT TRANSFER**	**APPLICATIONS**	**METHODS**
	Room: 2104 CEI	**Room: 2103 CEI**	**Room: 2102 CEI**	**Room: 2101 CEI**
	CHAIR: C. Mavriplis	CHAIR: C. deGroot	CHAIR: Y.-C. Jin	CHAIR: B. Vermiere
10:30 to 10:50	Large Eddy Simulation of Rough Surface Turbulent Flow in Open Channel **CFD2017-210** Zhang, Z., Li, S. Concordia U, Montreal, Canada	Coupled Conjugate Heat Transfer for Prediction of Laminar Diffusion Co-Flow Flames Using a Partitioned Approach **CFD2017-303** Syed, W., Groth, C. UTIAS, U Toronto, Toronto, Canada	CFD Analysis of Inflow Control Devices Used in SAGD **CFD2017-324** Miersma, M., Lange, C. U Alberta, Edmonton, Canada	Prediction of turbulent flow in a rough pipe using a near-wall RANS model **CFD2017-302** Chu, M., Bergstrom, D. U Saskatchewan, Saskatoon, Canada
10:50 to 11:10	DNS Study of the Effect of Leading-Edge Bluntness on Transition of a Separating Laminar Boundary Layer **CFD2017-323** Brinkerhoff, J. U. British Columbia–Okanagan, Kelowna, Canada	Evaluation of Moment Closures for Predicting Radiation Transport Phenomena **CFD2017-404** Sarr, J., Groth, C. UTIAS, U Toronto, Toronto, Canada	Computational Fluid Dynamics Modeling of Human Coughs **CFD2017-325** Bi, R., Ali, S., Savory, E., Zhang, C. Western U, London, Canada	Model Order Reduction and Boundary Control of Incompressible Boussinesq Flow **CFD2017-326** Wang, Z., Flynn, M., Koch, C. U Alberta, Edmonton, Canada
11:10 to 11:30	Evaluation of Three-Dimensional Effects on Transitional Flow on a NACA 0018 Airfoil via Direct Numerical Simulation **CFD2017-101** Brinkerhoff, J. U. British Columbia–Okanagan, Kelowna, Canada	Fourteen-Moment Bi-Gaussian Closure for Non-Equilibrium Rarefied Gaseous Flows **CFD2017-411** Laplante, J., Groth, C. UTIAS, U Toronto, Toronto, Canada	Numerical Simulation of Heat Transfer in Vertical Fuel Bundles of 37-Element Canadian SCWR **CFD2017-335** Han, H., Zhang, C., Jiang, J. Western U, London, Canada	Rotating Compressible Flow in a Straight Duct **CFD2017-306** Dyck, N., Straatman, A. Western U, London, Canada
11:30 to 11:50	Direct Numerical Simulation of Three-Dimensional Plume Dispersion Released from a Pair of Ground-Level and Elevated Point Sources **CFD2017-203** Wang, B.-C., Oskouie, S. U Manitoba, Winnipeg, Canada	A New Moment Model For Radiative-Transport Prediction **CFD2017-407** Morin, W., McDonald, J. U Ottawa, Ottawa, Canada	Evaluation of Air Distribution Techniques for Coating Applications **CFD2017-338** McKinnon, M., Samara, F., Johnson, D. U Waterloo, Waterloo, Canada	Effects of Surface Tension on Curved Jets for Nanofiber Formation Applications **CFD2017-336** Noroozi, S., Taghavi, S. Université Laval, Québec City, Canada
11:50 to 12:10	Shear Layer Instability of the Wake of a Square Cylinder **CFD2017-319** Agbaglah, G., Mavriplis, C. U Ottawa, Ottawa, Canada	A Numerical Study of Natural Convective Heat Transfer from a Horizontal Isothermal Element with an Elliptical Wavy Surface **CFD2017-315** [1] Hussain, S., [2] Oosthuizen, P. [1] Al-Imam Muhammad Ibn Saud Islamic U, Riyadh, Saudi Arabia; [2] Queen's U, Kingston, Canada	Assessing the Accuracy of Nusselt Number Used in Overhead Conductor Codes Using LES **CFD2017-207** Abdelhady, M., Wood, D. U Calgary, Calgary, Canada	Uncertainty Quantification of Tabulated Supercritical Thermodynamics for Compressible Navier-Stokes Solvers **CFD2017-405** Praneeth, S. U Waterloo, Waterloo, Canada
12:10 to 12:30	High-Order, Multi-Parameter Flow Sensitivity Analysis **CFD2017-416** Pelletier, D., Garon, A. Polytechnique Montreal, Montreal, Canada	Effect of Free stream Turbulence on Smooth Flat Plate Heat Transfer **CFD2017-321** Sarkar, D., Graat, K., Savory, E. Western U, London, Canada	A Thickened Flame Model (TFM) for Simulation of Premixed Propane-Air Tulip Flame **CFD2017-421** Movahedi, Z., Gallage, I., Sobiesiak, A. U Windsor, Windsor, Canada	OPEN
12:30 to 14:00	**LUNCH**		**CEI 1100**	

TUESDAY PM - June 20, 2017

14:00	Plenary Lecture	CEI 1100	M. Rumpfkeil	CFD in Undergraduate
15:00	Coffee	CEI Lobby		Engineering Education
15:20 to 16:30	**Session D**			
	Open Discussion - CFD in the Engineering Curriculum:			
	(From the perspective of students, academia, industry and software suppliers)			
	Room: 1101 CEI			
	CHAIR: G.W. Rankin			
18:30 to 22:00	**BANQUET**		**CAESARS WINDSOR HOTEL**	

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SEE YOU IN 2018!