# Pre-RGD32 Online Workshop on Recent Hot Topics in Rarefied Gas Dynamics

**Note: ZOOM-1 Will Be Open Throughout For Free Meeting**
[1] **KST/JST 22:00 (CST 21:00, IST 18:30) (7-8th)**
[2] **BST 14:00 (GMT 13:00, CEST 15:00) (7th)**
[3] **PDT 06:00 (EDT 09:00) (7th)**

**http://www.rgd32.org/preworkshop.asp for the Presentation Video**
**Update: June 22nd, 2021**

| Time | First Day Program (July 7-8th, Wed-Thu) | | |
|---|---|---|---|
| 22:00~22:10[1]<br>14:00~14:10[2]<br>06:00~06:10[3] | **Opening & Announcement of Best Student Presentation I (ZOOM-1)**<br>(Chairs: R. S. Myong, *Gyeongsang National University*; D. Bruno, *National Research Council*; K. Xu, *Hong Kong University of Science and Technology*; J. S. Wu, *National Chiao Tung University*) | | |
| 22:10~23:10<br>14:10~15:10<br>06:10~07:10 | **Invited Lecture I (ZOOM-1)**<br>**The Saga of LBE's Quest for RGD Effects**<br>**Li-Shi Luo,** *Old Dominion University*<br>(Chair: L. Mieussens, *Institut de Mathématiques de Bordeaux*) | | |
| **Break Time (10 mins)** | | | |
| | **Boltzmann and Related Equations (ZOOM-1A)**<br>(Chair: S. Takata, *Kyoto University*) | **Numerical Methods for Kinetic Equations (ZOOM-1B)**<br>(Chair: K. Xu, *HKUST*) | **Gas-surface Interactions and Vacuum (ZOOM-1C)**<br>(Chair: E. Roohi, *Xi'an Jiaotong University*) |
| 23:20~23:30<br>15:20~15:30<br>07:20~07:30 | Passage from the Boltzmann Equation with Diffuse Boundary to the Incompressible Euler Equation with Heat Convection (C-01)<br>**Y. Cao**, J. Jang, C. Kim<br>*Rutgers University* | Three-Dimensional Unified Gas-Kinetic Scheme for Moving Object Simulation in All Knudsen Regimes (Z-01)<br>**Y. Zhu**, C. Zhong, K. Xu<br>*The Hong Kong University of Science and Technology* | Interaction of Two-Dimensional Rarefied Jets-From Free Molecular to Continuum Regime (V-03)<br>**J. E. Vesper***, T. Broeders, D. E. A. van Odyck, C. R. Kleijn<br>*Delft University of Technology* |
| 23:30~23:40<br>15:30~15:40<br>07:30~07:40 | A Poisson Map from Kinetic Theory to Hydrodynamics with Non-Constant Entropy (C-06)<br>**C. L. Chong***<br>*University of Oxford* | Simplified Unified Wave-Particle Method and Direct Relaxation Process (L-06)<br>**S. Liu**, S. Yang, M. Fang, C. Zhong<br>*Northwestern Polytechnical University* | Variational Derivation of Thermal Slip Coefficients on the basis of the Boltzmann Equation for Hard-Sphere Molecules and Cercignani-Lampis Boundary Conditions: Comparison with Experimental Results (N-03)<br>**N. N. Nguyen**, S. Lorenzani<br>*Politecnico di Milano* |
| 23:40~23:50<br>15:40~15:50<br>07:40~07:50 | Cauchy Problem and Weighted L^P_K Solutions of The System of Boltzmann Equations for Monatomic Gas Mixtures (D-01)<br>**E. de la Canal***, I. M. Gamba, M. Pavić-Čolić<br>*University of Texas at Austin* | A Closure for High-Order Velocity Moments Equations Based on a Projection Technique (P-03)<br>**T. Pichard**<br>*Institut polytechnique de Paris* | Mean-Field Kinetic Theory Analysis of Evaporation Coefficient and Condensation Coefficient of Vapor Molecules in the Presence of Non-Condensable Gas under Non-Equilibrium Conditions (O-02)<br>**K. Ohashi***, K. Kobayashi, H. Fujii, M. Watanabe<br>*Hokkaido University* |
| 23:50~00:00<br>15:50~16:00<br>07:50~08:00 | Geometric Correction for Boundary Layer Expansion in Kinetic Theory (G-06)<br>**Y. Guo**<br>*Brown University* | Numerical Modeling of Rarefied Gases Using an ES-BGK Collision Model for the Boltzmann Equation (V-01)<br>**D.A.M. van der Woude***, M.R.A. Abdelmalik, E.H. Van Brummelen<br>*Eindhoven University of Technology* | Thermal Transpiration Flows Induced by Differences in Accommodation Coefficients (S-09)<br>**S. Sugimoto***, H. Sugimoto<br>*Kyoto University* |
| 00:00~00:10<br>16:00~16:10<br>08:00~08:10 | Stationary BGK Models for Chemically Reacting Gas in a Slab (L-01)<br>**M.-S Lee***, D. Kim, S.-B Yun<br>*Sungkyunkwan University* | Complex Thermally Induced Gas Flows Due to the Competition of Natural Convection and Thermal Creep (Y-04)<br>**S. Yao***, J. Zhang, F. Fei<br>*Beihang University* | Propagation of Two-Dimensional Acoustic Disturbances in a Rarefied Gas (M-04)<br>**A. Manela**, Y. Ben-Ami<br>*Technion - Israel Institute of Technology* |
| 00:10~00:20<br>16:10~16:20<br>08:10~08:20 | On the Cauchy Problem for Spatial Homogeneous Boltzmann Model Describing a Polyatomic Gas (P-02)<br>**M. Pavić-Čolić**, I. M. Gamba<br>*University of Novi Sad* | Recent Progress on Efficient Multiscale Numerical Methods for Kinetic Equations (L-05)<br>**C. Liu**<br>*Institute of Applied Physics and Computational Mathematics* | |
| **Break Time (10 mins)** | | | |

| | **Lagrangian Methods for the BGK Model (ZOOM-1A)**<br>(Chair: S. B. Yun, *Sungkyunkwan University*) | **Numerical Methods for Kinetic Equations and Multiphase Flows (ZOOM-1B)**<br>(Chair: V. Titarev, *Russian Academy of Sciences*) | **Hypersonics: Theory and Simulation I (ZOOM-1C)**<br>(Chair: I. J. Wysong, *AFRL*) |
|---|---|---|---|
| 00:30~00:40<br>16:30~16:40<br>08:30~08:40 | Conservative Semi Lagrangian Methods for Kinetic Equations (R-05)<br>**G. Russo**, S. Boscarino, S. Y. Cho, S.-B. Yun<br>*University of Catania* | Spectral Hermite Approximation of Boltzmann's Bilinear Collision Operator (H-01)<br>**A. Hanke***, M. Torrilhon<br>*RWTH Aachen* | Analysis of the Intermediate Experimental Vehicle (IXV) Rarefied Aerothermodynamics (S-02)<br>**M. Schouler***, Y. Prévereaud, L. Mieussens<br>*ONERA* |
| 00:40~00:50<br>16:40~16:50<br>08:40~08:50 | BGK Models for Inert Mixtures: Comparison, Hydrodynamic Limits and Applications (G-05)<br>**M. Groppi**, S. Boscarino, S. Y. Cho, G. Russo<br>*University of Parma* | A Fast Fourier Spectral Method for the Non-Cutoff Boltzmann Equation (H-04)<br>J. Hu, **K. Qi***<br>*Purdue University* | Computational Study of Hypersonic Rarefied Gas Flow over Re-Entry Vehicles Using the Second-Order Boltzmann-Curtiss Constitutive Model (C-07)<br>**T. Chourushi***, A. S. Vishnu, S. Singh, R. S. Myong<br>*Gyeongsang National University* |
| 00:50~01:00<br>16:50~17:00<br>08:50~09:00 | Local Velocity Grid Conservative Semi Lagrangian Schemes for the BGK Model (C-04)<br>**S. Y. Cho**, S. Boscarino, G. Russo<br>*University of Catania* | High Instability Region for Dilute Granular Gases of Inelastic and Rough Hard Disks (M-08)<br>**A. Megias***, A. Santos<br>*Universidad de Extremadura* | Improved Theory for Shock Waves Using OBurnett Equations (J-01)<br>**R. S. Jadhav***, Amit Agrawal<br>*Indian Institute of Technology Bombay* |
| 01:00~01:10<br>17:00~17:10<br>09:00~09:10 | Towards Uniformly Accurate Semi Lagrangian Methods for the BGK Model of Boltzmann Equation (B-05)<br>**S. Boscarino**, S. Y. Cho<br>*University of Catania* | Stochastic Simulation of a Spherical Rigid Particle Suspended in a Rarefied Gas (V-02)<br>**N. Vasileiadis**, D. Valougeorgis<br>*University of Thessaly* | Vibrational Modelling with Anharmonic Model in DSMC (C-10)<br>**C. Civrais***, C. White, R. Steijl<br>*University of Glasgow* |
| 01:10~01:20<br>17:10~17:20<br>09:10~09:20 | Interaction of Rigid Body Motion and Rarefied Gas Dynamics (T-03)<br>**S. Tiwari**, A. Klar, G. Russo<br>*TU Kaiserslautern* | Flow Dynamics of a Shock Accelerated Square Heavy Bubble in Diatomic and Polyatomic Gases (S-07)<br>**S. Singh**, M. Battiato<br>*Nanyang Technological University* | Partition Functions and Heat Capacities for High Temperature Applications (B-07)<br>**M. Buchowiecki**<br>*University of Szczecin* |
| 01:20~01:30<br>17:20~17:30<br>09:20~09:30 | Convergence Estimates for Semi-Lagrangian Schemes for BGK Type Models (Y-05)<br>**S.-B. Yun**, S. Boscarino, S. Y. Cho, G. Russo<br>*Sungkyunkwan University* | Odorous Chemical Substances of Microorganisms Associated with Household Air-Conditioning Systems (K-04)<br>**J. Kim**<br>*Inha Institute of Space science and Technology* | |
| 01:30~01:40<br>17:30~17:40<br>09:30~09:40 | | Fully Adaptive Lattice Boltzmann Methods based on Multiresolution Analysis: Error Control, High Accuracy, Equivalent Equations and Grid Jumps (B-03)<br>**T. Bellotti***, L. Gouarin, B. Graille, M. Massot<br>*Institut Polytechnique de Paris* | |

* Graduate Student

# Pre-RGD32 Online Workshop on Recent Hot Topics in Rarefied Gas Dynamics

**Note: ZOOM-2 Will Be Open Throughout For Free Meeting**

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[1] **KST/JST 22:00 (CST 21:00, IST 18:30) (8-9th)**

[2] **BST 14:00 (GMT 13:00, CEST 15:00) (8th)**

[3] **PDT 06:00 (EDT 09:00) (8th)**

| Time | Second Day Program (July 8-9th, Thu-Fri) | | |
|---|---|---|---|
| 22:00~22:10[1]<br>14:00~14:10[2]<br>06:00~06:10[3] | **Opening & Announcement of Best Student Presentation II (ZOOM-2)**<br>(Chairs: R. S. Myong, *Gyeongsang National University*; D. Bruno, *National Research Council*; K. Xu, *Hong Kong University of Science and Technology*; J. S. Wu, *National Chiao Tung University*) | | |
| 22:10~23:10<br>14:10~15:10<br>06:10~07:10 | **Invited Lecture II (ZOOM-2)**<br>**Laser Induced Plasma Dynamics: From Atomic and Molecular Spectra to Particle Formation**<br>**Alessandro De Giacomo,** *University of Bari*<br>(Chair: D. Bruno, *National Research Council*) | | |
| **Break Time (10 mins)** | | | |
| | **Kinetic Theory for Gases and Complex System (ZOOM-2A)**<br>(Chair: M. Torrilhon, *RWTH Aachen University*) | **Space Propulsion and Molecular Beams (ZOOM-2B)**<br>(Chair: E. J. Jun, *Korea Advanced Institute of Science and Technology*) | **Hypersonics: Theory and Simulation II (ZOOM-2C)**<br>(Chair: R. Kumar, *IIT Kanpur*) |
| 23:20~23:30<br>15:20~15:30<br>07:20~07:30 | Moment Equations for a Polyatomic Gas Issuing from the Kinetic Theory (D-03)<br>**V. Djordjić***, M. Pavić-Čolić, M. Torrilhon<br>*RWTH Aachen University* | Dynamics of a Nonlinearly Coupled Light and Particle Beam Propagation (K-07)<br>**P. Kumar**, K. Hara<br>*Stanford University* | Parallel DSMC Implementation of Detailed Surface Chemistry Mechanisms (L-04)<br>A. S. Litvintsev, A. N. Molchanova, A.V. Kashkovsky, **Y. A. Bondar**<br>*Khristianovich Institute of Theoretical and Applied Mechanics SB RAS (ITAM)* |
| 23:30~23:40<br>15:30~15:40<br>07:30~07:40 | Recent Advances in the Theory of Kinetic Equations of Collision Dynamics (G-01)<br>**I. V. Gapyak**, V. I. Gerasimenko<br>*Taras Shevchenko National University of Kyiv* | Kinetic Modeling of Electrospray Thrusters with Particle-in-Cell and Molecular Dynamics (N-04)<br>**N. Nuwal***, V. Azevedo, M. Klosterman, D. A. Levin, J. L. Rovey<br>*University of Illinois at Urbana-Champaign* | Non-Equilibrium Chemical Reaction Models for Zeldowich Reactions for Hypersonic Re-Entry Flows (M-05)<br>**T. K. Mankodi**, R. S. Myong<br>*Indian Institute of Technology Guwahati* |
| 23:40~23:50<br>15:40~15:50<br>07:40~07:50 | Approximation for the Maximum-Entropy Twenty-One-Moment of Rarefied Gas Dynamics (G-04)<br>**F. Giroux**, J. G. McDonald<br>*University of Ottawa* | CFD, DSMC and Ray-Tracing: Modelling a Rarefied Gas Plume in an Industrial Context (Z-02)<br>**B. Zitouni**<br>*OHB System AG* | Low-Frequency Molecular Fluctuations in a One-Dimensional Shock (S-01)<br>**S. S. Sawant***, D. A. Levin, V. Theofilis<br>*University of Illinois at Urbana-Champaign* |
| 23:50~00:00<br>15:50~16:00<br>07:50~08:00 | On Entropy Growth across the Shock Structure in Mixtures (M-02)<br>D. Madjarević, M. Pavić-Čolić, **S. Simić**<br>*University of Novi Sad* | On the Electronic Structure of Excited Neutral Argon Clusters (D-02)<br>**M. Dhiman***, B. Gervais, J. Douady<br>*CIMAP* | Application of Different Numerical Approaches to High Temperature Adiabatic Bath Relaxation (W-01)<br>**I. J. Wysong**, S. F. Gimelshein, A. J. Fangman, D. A. Andrienko, O. V. Kunova, E. V. Kustova, C. Garbacz, M. Fossati, K. Hanquist<br>*AFRL* |
| 00:00~00:10<br>16:00~16:10<br>08:00~08:10 | Investigation of the Aerodynamic Characteristics of Aircraft in a Rarefied Gas Flow by the Moment Method (S-10)<br>**A. Sakabekov**, Y. Auzhani, A. Dauletov<br>*Satbayev University* | Aeroseparation of Binary Gas Mixture in Converging-Diverging Micronozzle (K-06)<br>**V. V. Kosyanchuk**, A. N. Yakunchikov<br>*Institute of Mechanics of Lomonosov Moscow State University* | Rarefied Multispecies Simulation with Fast Iterative Solver Applied to Nonlinear Coupled Constitutive Relations (B-02)<br>**C. Baek***, S. Lee<br>*Inha University* |
| 00:10~00:20<br>16:10~16:20<br>08:10~08:20 | On the Entropic Property of the Ellipsoidal Statistical Model with the Prandtl Number below 2/3 (T-01)<br>S. Takata, M. Hattori, **T. Miyauchi***<br>*Kyoto University* | | Oxygen Catalytic Recombination on Silica Surface from Microscopical Analysis (Y-03)<br>**Y. Yang**, J. G. Kim<br>*Sejong University* |
| **Break Time (10 mins)** | | | |

| | **Relativistic Kinetic Theory (ZOOM-2A)**<br>(Chair: L. Mieussens, *Institut de Mathématiques de Bordeaux*) | **Plasma Flows (ZOOM-2B)**<br>(Chair: J. S. Wu, *National Chiao Tung University*) | **Jets, Plumes and Surface Interaction in Space (ZOOM-2C)**<br>(Chair: K. Suzuki, *University of Tokyo*) |
|---|---|---|---|
| 00:30~00:40<br>16:30~16:40<br>08:30~08:40 | The Relativistic Quantum Boltzmann Equation Near Equilibrium (B-01)<br>**G.-C. Bae**, J. W. Jang, S.-B. Yun<br>*Sunglyunkwan University* | A Collisional Radiative Model for Hydrogen Plasmas (B-06)<br>**D. Bruno**<br>*National Research Council* | DSMC Modeling of Plume Impingement on a Lunar Surface (C-03)<br>**A. K. Chinnappan***, R. Kumar, V. Arghode<br>*Indian Institute of Technology Kanpur* |
| 00:40~00:50<br>16:40~16:50<br>08:40~08:50 | Improving the BGK Model: Velocity Dependent Collision Frequency and Quantum Description (P-04)<br>**M. Pirner**<br>*Universitat Wurzburg* | Improved Particle Time Integration for Solving the Vlasov-Fokker-Planck Equations (C-09)<br>**K. Chung***, F. Fei, H. Gorji, P. Jenny<br>*Institute of Fluid Dynamics* | Europa Lander Plume-Induced Contamination: DSMC Modeling of Monopropellant Plume Testing (C-11)<br>**A. Conte***, W. A. Hoey, A. T. Wong, C. E. Soares, M. Grabe, C. Hepp<br>*Politecnico di Torino* |
| 00:50~01:00<br>16:50~17:00<br>08:50~09:00 | Time Parameterizations and Relaxation Models in Relativistic Kinetic Theory (C-02)<br>**G. Chacón-Acosta**<br>*Universidad Autónoma Metropolitana-Cuajimalpa* | Development of a Solar Corona-Satellite Interaction Pic Simulation with Object-Oriented Approach (G-02)<br>**J. A. Garcia Perez***, K. Suzuki<br>*University of Tokyo* | Development of an OpenFOAM Solver with Applications to Non-Equilibrium Multiphase Flows: From Outer Space to under Our Skin (E-01)<br>**O. Ejtehadi**, T. K. Mankodi, E. Mahravan, E. Esmaeilifar, A. Rahimi, I. Sohn, R. S. Myong<br>*KISTI* |
| 01:00~01:10<br>17:00~17:10<br>09:00~09:10 | A Controversy in Relativistic Heat Conduction: The Theory's Order and Frame Dependence (G-03)<br>**A. L. García-Perciante**<br>*Universidad Autónoma Metropolitana-Cuajimalpa* | Development of Parallel Hybrid Fluid Model and Electron Monte-Carlo Method for Plasma Simulation (L-03)<br>**Y. -M. Lee**, M. -H. Hu, J.-S. Wu<br>*Nation Chao Tung University* | Rarefied Gas and Free Molecular Flow Modeling Applications in Spacecraft Contamination Control at JPL (H-03)<br>**W. A. Hoey**, C. E. Soares, J. R. Anderson, J. M. Alred<br>*Jet Propulsion Laboratory* |
| 01:10~01:20<br>17:10~17:20<br>09:10~09:20 | On a Relativistic BGK Model for Polyatomic Gases Near Equilibrium (H-05)<br>**B. -H. Hwang**, T. Ruggeri, S. -B. Yun<br>*Sunglyunkwan University* | Simulations of Instabilities and Sheaths in Low-Temperature Partially-Magnetized Plasmas via Low-Order Moment Methods: Advanced Numerical Methods and Comparison with Kinetic Simulations (R-03)<br>**L. Reboul***, A. Alvarez-Laguna, T. Magin, P. Chabert, A. Bourdon, M. Massot<br>*CMAP* | Analysis of Granular Flow around a Circular Cylinder (M-07)<br>**A. K. Mathews**, A. Khan, B. Sharma, S. Kumar, R. Kumar<br>*Indian Institute of Technology Kanpur* |
| 01:20~01:30<br>17:20~17:30<br>09:20~09:30 | A Complete Picture for the 2D Transport Coefficients within the Relaxation Approximation: the Relativistic, Degenerate, Non-Vanishing Rest Mass Case (M-10)<br>**A. R. Méndez**, A. L.García-Perciante, G. Chacón-Acosta<br>*Universidad Autónoma Metropolitana-Cuajimalpa* | Development of One-Dimensional Analytical Model for a Sparkjet Actuator (S-04)<br>**J. Y. Shin***, K. H. Kim<br>*Seoul National University* | Continuum Based Simulation of Plume Surface Interaction at Low Altitude in Descend/Ascend Phase of the Lunar Landing Along with Surface Erosion (R-01)<br>**A. Rahimi**, O. Ejtehadi, R. S. Myong<br>*University West* |
| 01:30~01:40<br>17:30~17:40<br>09:30~09:40 | Relativistic Lattice Boltzmann Method for Rarefied Gases (S-06)<br>**D. Simeoni***, L. Bazzanini, A. Gabbana, S. Succi, R. Tripiccione<br>*Università di Ferrara and INFN-Ferrara* | | CFD/DSMC Hybrid Method for Gas–Particle Two-Way Coupled Simulation under Vacuum (Y-02)<br>**L. Yang***, C. Yuhong, W. Jianshan, S. Jiameng<br>*Tianjin University* |

* Graduate Student

# Pre-RGD32 Online Workshop on Recent Hot Topics in Rarefied Gas Dynamics

**Note: ZOOM-3 Will Be Open Throughout For Free Meeting** **http://www.rgd32.org/preworkshop.asp for the Presentation Video**

[1] **KST/JST 08:00 (CST 07:00, IST 04:30) (10th)**

[2] **BST 00:00 (GMT 23:00, CEST 01:00) (9-10th)**

[3] **PDT 16:00 (EDT 19:00) (9th)**

| Time | Third Day Program (July 9-10th, Fri-Sat) | | |
|---|---|---|---|
| 08:00~08:10[1]<br>00:00~00:10[2]<br>16:00~16:10[3] | **Opening & Announcement of Best Student Presentation III (ZOOM-3)**<br>(Chairs: R. S. Myong, *Gyeongsang National University*; D. Bruno, *National Research Council*; K. Xu, *Hong Kong University of Science and Technology*; J. S. Wu, *National Chiao Tung University*) | | |
| 08:10~09:10<br>00:10~01:10<br>16:10~17:10 | **Invited Lecture III (ZOOM-3)**<br>**Fluid Mechanics in Fight Against COVID19 Pandemic**<br>**Alina Alexeenko,** *Purdue University*<br>(Chair: R. S. Myong, *Gyeongsang National University*) | | |
| **Break Time (10 mins)** | | | |
| | **Data-driven & ML-based Mesoscale Modeling (ZOOM-3A)**<br>(Chair: T. K. Mankodi, *IIT Guwahati*) | **Micro- & Nano-scale Flows and Heat Transfer I (ZOOM-3B)**<br>(Chair: Y. Zhang, *University of Edinburgh*) | **Hypersonics: Experimental Methods (ZOOM-3C)**<br>(Chair: G. Park, *Korea Advanced Institute of Science and Technology*) |
| 09:20~09:30<br>01:20~01:30<br>17:20~17:30 | Data-Driven Approach of the Rosenbluth-Fokker-Planck Equation (C-08)<br>**K. Chung***, F. Fei, H. Gorji, P. Jenny<br>*Institute of Fluid Dynamics* | Self-Diffusivity of Hard-Sphere Fluids Confined in Slits (C-12)<br>**C. Corral-Casas***, L. Gibelli, J. Li, M. K. Borg, Y. Zhang<br>*University of Edinburgh* | Drag Measurement of a Free-Flying Box-Shaped Model in a Shock Tunnel (C-05)<br>**I. Choi***, G. Park<br>*Korea Advanced Institute of Science and Technology* |
| 09:30~09:40<br>01:30~01:40<br>17:30~17:40 | Discovery of Governing Equations Based on Molecular Simulation of Gas Flows (M-01)<br>**W. Ma***, J. Zhang<br>*Beihang University* | Variation of Surface Accommodation Coefficients with Microscopic and Macroscopic Properties in Diatomic Gases (K-01)<br>**K. K. Kishore**, R. S. Myong<br>*Gyeongsang National University* | An Atomic Laser-Induced Fluorescence Diagnostic for Measuring Velocity Distributions in High-Enthalpy Impulse Facilities (C-13)<br>**S. Cousens**, S. O'Byrne<br>*University of New South Wales* |
| 09:40~09:50<br>01:40~01:50<br>17:40~17:50 | A Gas-Surface Interaction Model for Diatomic Rarefied Gas Flows Based on an Unsupervised Machine Learning Technique (N-02)<br>**S. Mohammad Nejad**, E. Iype, F. Peters, B. Vollebregt, S. Nedea, A. Frijns<br>*Eindhoven University of Technology* | Insight of the Boundary Conditions of Simple Liquid Flow Through Carbon Nanotube: Continuum to Nanoscale (K-02)<br>**K. E. Karim***, B. H. Kim<br>*University of Ulsan* | Overview of Evaluation for an Ablative Thermal Protection System Using Ground Test Facilities (L-02)<br>**S. Lee**, J. G. Kim, G. Park<br>*Korea Advanced Institute of Science and Technology* |
| 09:50~10:00<br>01:50~02:00<br>17:50~18:00 | Application of Neural-Network-based Method to Numerical Analysis of Shock Wave Structure (R-02)<br>**R. Raj***, K. Suzuki<br>*University of Tokyo* | Origin of Interface Phenomena in Nanochannel Heat Transfer (M-06)<br>**M. Masuduzzaman***, B. H. Kim<br>*University of Ulsan* | On the Review of Diffusion Coefficient Measurement of Gas Mixtures in the Rarefied Gas Regions (M-13)<br>**K. Munusamy***, S. O'Byrne<br>*UNSW-Canberra* |
| 10:00~10:10<br>02:00~02:10<br>18:00~18:10 | Multiscale Numerical Modeling of Pyrolysis Kinetics (B-08)<br>**A. Bhesania***, R. K. Mathpal, V. Arghode<br>*Indian Institute of Technology Kanpur* | Stefan-Maxwell Diffusivities of Lennard-Jones Gas Mixtures (Z-03)<br>**M. Zyskin,** C. W. Monroe<br>*University of Oxford* | Alleviation of Shock Train Oscillation Using Boundary Layer Suction (V-04)<br>**P. S. Vignesh Ram**, J. G. Kim<br>*Sejong University* |
| 10:10~10:20<br>02:10~02:20<br>18:10~18:20 | | On the role of boundary conditions in the theory of motion of small particles in a rarefied gas (S-11)<br>V.G. Chernyak, **T.V. Sograbi**<br>*Ural Federal University* | State-Specific and Multi-Temperature Models of Co2 Vibrational-Chemical Kinetics (K-05)<br>**A. A. Kosareva***, O. V. Kunova, E. V. Kustova, E. A. Nagnibeda<br>*Saint-Petersburg State University* |
| **Break Time (10 mins)** | | | |

| | **DSMC Methods (ZOOM-3A)**<br>(Chair: Y. A. Bondar, *ITAM*) | **Micro- & Nano-scale Flows and Heat Transfer II (ZOOM-3B)**<br>(Chair: B. H. Kim, *University of Ulsan*) | **Hypersonics: Vehicles (ZOOM-3C)**<br>(Chair: J. G. Kim, *Sejong University*) |
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| 10:30~10:40<br>02:30~02:40<br>18:30~18:40 | Evaluation of the Generalized Bernoulli Trails (GBT) Collision Scheme in Treating Rarefied Flows (S-05)<br>**A. Shoja-sani***, E. Roohi, S. Stefanov<br>*Xi'an Jiaotong University* | Kinetic Study of Microchannel Flows (A-01)<br>**N. Adhikari***, J. Hu, A. A. Alexeenko<br>*Purdue University* | Effect of Thermochemical Ablation at the Fluid-Solid Interface of a Hypersonic Reentry Vehicle (A-03)<br>**A. Appar***, R. Kumar<br>*Indian Institute of Technology Kanpur* |
| 10:40~10:50<br>02:40~02:50<br>18:40~18:50 | Some Issues on Boundary Conditions in DSMC Application to Compressible Internal Flow (M-03)<br>**M. M. Abdullah Al***, H. D. Kim<br>*Andong National University* | Nano-Confinement Effect on the Continuum Approach (A-02)<br>**J. A. Hossain***, B. H. Kim<br>*University of Ulsan* | CFD/Radiation Analysis of the Chelyabinsk and St Valentine Meteoroids (R-04)<br>**P. Reynier**, M. L. Da Silva<br>*Ingénierie et Systèmes Avancés* |
| 10:50~11:00<br>02:50~03:00<br>18:50~19:00 | Improved Modeling of Low-Probability Processes in DSMC (O-01)<br>**G. Oblapenko**, D. Goldstein, P. Varghese, C. Moore<br>*University of Texas at Austin* | Nonequilibrium Flows near Membranes with Anomalous Heat and Stress Transfer and Possibilities for Their Experimental Verification (A-04)<br>**V. V. Aristov**, P. Perrier, I.V. Voronich, S.A. Zabelok<br>*Federal Research Center "Computer Science and Control" of Russian Academy of Sciences* | A Study on the Optimization of the Minimum Heat Transfer Re Entry Trajectory for the Space Shuttle Geometry Using Monte Carlo Method (K-03)<br>**D. Kim***, D. Han, G. H. Choi, K. H. Kim<br>*Seoul National University* |
| 11:00~11:10<br>03:00~03:10<br>19:00~19:10 | Improving DSMC Axisymmetric Simulation Using Variable Time Step (VTS) Method (P-01)<br>C. Y. Pan, **M. C. Lo**, J. S. Wu<br>*Nation Chao Tung University* | Separation of Rarefied Gas in Bent Channel at Low Reynolds Number (H-02)<br>**M. T. Ho**, J. Li, W. Su, L. Wu, M. Borg, Z. Li, Y. Zhang<br>*University of Edinburgh* | Design Optimization Method for Hypersonic Waverider Vehicle (S-08)<br>**J. Son***, C. Son, K. Yee<br>*Seoul National University* |
| 11:10~11:20<br>03:10~03:20<br>19:10~19:20 | Visualizing the Effects of Chemistry with a Novel Quasi-Particle Method (P-05)<br>**Y. K. Poondla**, P. L. Varghese, D. B. Goldstein<br>*University of Texas at Austin* | Temperature and Pressure Driven Polyatomic Gas Flows in Long Ducts (T-02)<br>**C. Tantos**, S. Varoutis, C. Day<br>*Karlsruhe Institute of Technology* | Recent Improvements to the SPARTA DSMC Code (M-12)<br>**S. G. Moore**, S. J. Plimpton, M. A. Gallis<br>*Sandia National Laboratories* |
| 11:20~11:30<br>03:20~03:30<br>19:20~19:30 | Numerical Study of Interaction between Shock and Micro-Scale Vortex Using DSMC Method (B-04)<br>**Y. Bi**, D. Wu<br>*Chinese Academy of Sciences* | Heat Transfer in a Rarefied Gas between Profiled Surfaces Moving Relative to Each Other (Y-01)<br>**A. N. Yakunchikov**<br>*Lomonosov Moscow State University* | |
| 11:30~11:40<br>03:30~03:40<br>19:30~19:40 | | Bulk Viscosity of Dilute Diatomic Gases (S-03)<br>**B. Sharma***, R. Kumar<br>*Indian Institute of Technology Kanpur* | |

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