

# ***Sunday, September 24, 2023***

## **Session 1: Short Course**

Chair: M. A. Gallis

1:00-5:00	<b>Sparta: A Parallel, Flexible, Open-Source DSMC Code</b> S. J. Plimpton, S.G. Moore, M.A. Gallis
5:30-8:30	<b>Welcome Reception</b>
7:30	<b>Social gathering for RGD NextGen</b>

# ***Monday, September 25, 2023***

## **Session 2: Keynote Lecture**

Chair: M. A. Gallis, A. L. Garcia

8:00-8:20	<b>Welcome</b> J. S. Lash
8:20-9:20	<b>Graeme A. Bird Keynote Lecture:</b> <b>QuiPS: How a Discrete Velocity Technique Morphed into Monte Carlo Simulation</b>  P. Varghese
9:20-9:40	<b>Break</b>

# ***Monday, September 25, 2023***

## **Session 3: Non-Continuum Flows I**

Chair: T. E. Schwartzentruber

9:40-10:00	<b>Predictive Analysis of Atmosphere-Breathing Electric Propulsion using SPARTA Framework</b> G. Moon, E. Jun
10:00-10:20	<b>Quantum Mechanically Derived Monte-Carlo Simulations of Hypervelocity Experiments</b> M. Grover, P. Valentini, N. Bisek
10:20-10:40	<b>Simulation of Rarefied Hypersonic Gas Flow: Comparison of RNS and DSMC Methods</b> A. Fedoseyev, J. Ouazzani
10:40-11:00	<b>Comparison between DSMC and CFD for Hypersonic Planetary Entry Simulations</b> A. Borner, D. Prabhu
11:00-11:20	<b>A Robust Numerical Scheme for Fluctuating Hydrodynamics of Multispecies Gas Mixtures</b> I. Srivastava, D. Ladiges, A. Nonaka, A. Garcia, J. Bell
11:20-11:40	<b>Exploitation of the DSMC Method in Modelling the Particle Exhaust of Nuclear Fusion Devices</b> S. Varoutis, C. Tantos, C. Day, C. Dhard, D. Naujoks
11:40-1:00	<b>Lunch</b>

# **Monday, September 25, 2023**

## **Session 4: Non-Continuum Flows II**

Chair: E. Jun

1:00-1:20	<b>DSMC Simulations of The Shuttle Plume Impingement Flight EXperiment (SPIFEX)</b> B. Stewart, P. Clarke, and F. Lumpkin III
1:20-1:40	<b>Design and Simulation of a High-altitude Waverider .</b> A. Klothakis, I. Nikolos
1:40 -2:00	<b>DSMC Simulation of Impinging Thruster Plumes for Space Debris Detumbling</b> A. Tiwari, S. Nair, D. Goldstein
2:00-2:20	<b>An In-depth Numerical Analysis of Mixture Gas Flows in Channels of Arbitrary Lengths and Various Pressure Drops Via Linear and Non-linear Kinetic Theory</b> C. Tantos, T. Teichmann, I. Sarris, C. Day
2:20-2:40	<b>Dynamic Population Balance in SPARTA Using Stochastic Weighted Particle Methods</b> A. Hong, M. Gallis
2:40-3:00	<b>Break</b>

# Monday, September 25, 2023

## Session 5: Hybrids

Chair: S.G.Krishnan

3:00-3:20	<b>Hybridization of Staggered Compressible FHD and DSMC</b> D. Ladiges, I. Srivastava, A. Garcia, J. Bell
3:20-3:40	<b>hybridDCFoam: A Coupled DSMC/NSF Solver for Steady-State Gas Flows in OpenFOAM</b> N. Vasileiadis, C. White
3:40-4:00	<b>Hybrid CFD-DSMC Methodology for Optimizing Aerosol Injection Systems Used for Single-Particle Diffractive Imaging</b> S. Peravali, A. Samanta, M. Breuer, P. Neumann, M. Amin, J. Küpper
4:00-4:20	<b>Verification of an Open-Source Discontinuous Galerkin Fast Spectral (DGFS) Solver for the Full Boltzmann Equation using DSMC</b> N. Adhikari, B. Morton, E. Vorozhbit, J. Hu, A. Alexeenko
4:20-4:40	<b>Particle-Based Simulation of Polyatomic Gas Mixture Flows with the Ellipsoidal Statistical Bhatnagar-Gross-Krook Method</b> F. Hild, M. Pfeiffer
4:40-5:00	<b>Investigation of DSMC-inspired collisions for particle-laden flows</b> M. Kroells, T. Schwartzenruber
5:00-6:00	<b>SPARTA Users Meeting</b> S. Plimpton

## ***Tuesday, September 26, 2023***

### **Session 6: Algorithms**

Chair: B. M. Stewart

8:00-8:40	<b>Invited: How We Can Make DSMC More Computationally Scalable, While Preserving Its Accuracy</b> M. Borg
8:40-9:00	<b>A Fokker-Planck-Based Kinetic Model for Diatomic Rarefied Gas Flows</b> S. Kim and E. Jun
9:00-9:20	<b>Roulette Merge with Variable Weights</b> W. McDoniel, C. Moore
9:20-9:40	<b>Adaptive Discretization of Particles for Multiscale Non-Equilibrium Flows</b> S. Lauterbach, S. Fasoulas, M. Pfeiffer
9:40-10:00	<b>SPARTA Kokkos: Towards Exascale</b> S. Moore
10:00-10:20	<b>Break</b>

## ***Tuesday, September 26, 2023***

### **Session 7: Gas-Surface Interactions I**

Chair: A. Borner

10:20-10:40	<b>Simulation of Etch Pit Formation in DSMC through Active Sites in Carbon Fiber Micro-structures</b> K. Gopalan, S. Schmitt, A. Borner
10:40-11:00	<b>DSMC Simulations to Predict Permeability and Oxidation of Thermal Protection Systems Materials</b> V. Ramu, S. Poovathingal
11:00-11:20	<b>Boundary Layer Flow over Resolved Microstructure at Mars Sample Return Flight Conditions</b> I. Ramjatan, M. Kroells, and T. Schwartzentruber
11:20-11:40	<b>Fluid-Structure Interactions of Hypersonic Flow and Atmospheric Ice</b> E. Huff, H. Chen, S. Poovathingal
11:40-1:00	<b>Lunch</b>

# ***Tuesday, September 26, 2023***

## **Session 9: Chemistry**

Chair: S. Poovathingal

1:00-1:20	<b>Direct Molecular Simulation of Chemically Reacting 5-species Air Mixture across a Normal Shock</b> E. Torres, T. Gross, T. Schwartzenruber
1:20-1:40	<b>Adding Direct Molecular Simulation (DMS) Capabilities to The DSMC SPARTA Code: Overview of Recent Progress and Future Directions</b> P. Valentini, M. Grover, N. Bisek
1:40-2:00	<b>Electronic Excitation in DSMC Code SPARTA</b> Z. Eckert, M. Gallis
2:00-2:20	<b>Modeling of Chemical Reactions in Rarefied Gas Flows by the Kinetic Fokker-Planck Method</b> L. Basov, G. Oblapenko, M. Grabe
2:20-2:40	<b>Stochastic simulations of reacting flows under non-equilibrium conditions in the continuum regime</b> S. Trivedi, J. Harvey, J. Salinas, J. Chen
2:40-3:00	<b>Break</b>



## ***Tuesday, September 26, 2023***

### **Session 10: Planetary Flows**

Chair: J. Rabinovitch

3:00-3:20	<b>Fitting High-resolution DSMC Simulations of Water Vapor Cryovolcanic Plumes to Spacecraft Observations in a Timely Manner: How to Proceed?</b> A. Mahieux, D. Goldstein, P. Varghese, L. Trafton
3:20-3:40	<b>DSMC Applications in JPL Spacecraft Propulsion and Materials Engineering</b> W. Hoey, C. Soares, J. Anderson, A. Conte
3:40-4:00	<b>DSMC for Unsteady, Multi-Physics Problems in Planetary Science</b> P. Prem
4:00-4:20	<b>Simulating the Subsurface Conduits of Enceladus</b> M. Zaharias, A. Mahieux, D. Goldstein, P. Varghese, L. Trafton
4:20-4:40	<b>DSMC Modeling of Tvashtar Eruption: Effects of Radiation Confinement on Plume Structure</b> A. O. Adelaye, D. Goldstein, L. Trafton, P. Varghese, A. Mahieux
4:40-5:00	<b>Modeling of Plume-Solid Interaction and Estimation of Plume Impingement Forces</b> J. Meza-Galvan, A.M. Karis, E. Vorozhbit, P. Kazarin, S. Pugia, K. F. Gasaway, A. Cofer, A. Alexeenko
5:00-6:00	<b>RGD NextGen Connect Meeting</b>
6:30-9:00	<b>Conference Banquet</b>

## ***Wednesday, September 27, 2023***

### **Session 11: Plasmas and Instabilities**

Chair: D. Goldstein

8:00-8:40	<b>Invited: A Tale of Two non-Maxwellians</b> D. Levin
8:40-9:00	<b>A Computational Model Combining The Direct Simulation Monte Carlo Method with a Collision Radiation Plasma Model for Simulations of Laser-induced Non-equilibrium Plasma Plumes</b> A. Volkov, M. Stokes, O. Ranjbar, Z. Lin, S. Khairallah A. Rubenchik
9:00-9:20	<b>Effect of Plasma Shielding in Plumes Induced by Irradiation of Metal Targets with Bursts of Laser Pulses: Simulations Based on a DSMC Method Modified for Plasma Flows</b> M. Stokes, A. Volkov, S. Khairallah, A. Rubenchik, Z. Lin
9:20-9:40	<b>Modelling Gap Closure Within Pulsed Power Machines</b> G. Kirk, G. Oblapenko, D. Goldstein, P. Varghese, D. Sirajuddin, C. Moore
9:40-10:00	<b>Molecular-level Simulations of Vortex Shedding Onset Behind a Circular Cylinder</b> R. McMullen, M.A. Gallis
10:00-10:20	<b>Shockwave Laminar Boundary Layer Interactions for a Flow over Compression Ramp</b> I. Karpuzcu, D. Levin, V. Theofilis
10:20-10:40	<b>Break</b>

## ***Wednesday, September 27, 2023***

### **Session 12: Gas-Surface Interactions II**

Chair: A. Volkov

10:40-11:00	<b>DSMC simulations of Turbulent Flow over a Permeable Substrate</b> M. A. Gallis, R. M. McMullen, M. Krygier, J. R. Torczynski
11:00-11:20	<b>Modeling Low-Density Parachute Broadcloth Permeability for Mars Supersonic Inflations</b> S. Ghasimi, L. Chacon-Olivar, S. Poovathingal, J. Rabinovitch
11:20-11:40	<b>DSMC Simulations of Taylor-Couette Flow</b> T. Koehler, J. Torczynski, M. Gallis
11:40-1:00	<b>Lunch</b>