



**1994-1997 Lecturer; Department of Aerospace Engineering The Technion-Israel Institute of Technology, Haifa, Israel**

**1991-1994 Postdoctoral Fellow Department of Aerospace Engineering The Technion, Haifa, Israel**

**Address Department of Aerospace Engineering The Technion- Israel Institute of Technology, Haifa 32000 Israel**

**1988- 1991: Research Fellow, Moscow Institute for Steel and Alloys, Moscow, Russia**

**1986-1988 Research Engineer; Moscow Institute for Steel and Alloys, Moscow, Russia**

**Present name National University of Science and Technology MISIS**

**Address Leninsky Prospekt 4, Moscow, Russia, 119991**

### **Research experience**

**My research developments in aerodynamics include (i) development of vorticity confinement method for prediction of turbulent tip vortices for stationary and rotating wings, (ii) modeling of unsteady aerodynamics of flapping bio-inspired airfoils of micro air vehicles using high order compact schemes and development of the optimal program of motion of wings, (iii) obtained directivity of sound for interaction of chains of shed vortices impinging into air vehicles, (iv) modeling of subterranean drilling mud dynamics to avoid explosions in oil and gas exploration, (v) development of numerical model for phase change (sublimation) in hypersonic ablation, (vi) numerical investigation of hypersonic ramp flows in collaboration with AFRL, and (vii) modeling of break up of liquid jets in gas with application to cooling in material processing (grinding).**

**My developments in numerical methods for multi-scale micro and nano flows coupling of boundary singularity method (BSM) with (i) molecular methods (DSMC) and (ii) continuum**

**DOE: Heating of an ensemble of nanoparticles in a plasma radiation field in Rayleigh regime with considering radiative exchange between particles, Sept 2024-Sept 2025 (current) Role PI**

**NSF I Corps Teams: Delivery of coherent coolant jet and nozzle manufacturing for grinding technology, July 2022-Sept 2024 (current, no cost extended) NSF 2230411. Role PI, co-PI M Kaman**

**The Spak Fund (State of Ohio and University of Akron Research Foundation): Coherent coolant jet for grinding technology Sept 2023-Sept 2024 (current). Role PI**

**The State of Ohio and the Department of Higher Education, Regionally Aligned Priorities in Delivering Skills (RAPIDS-6) grant, Finishing Processes in Advanced Manufacturing Precision CNC Hard Turning Technology, Dec 2022-Dec 2024 (current). Role co-PI, PI Dr. S. Fahad (University of Akron).**

**Princeton Collaborative Low Temperature Plasma Research Facility (PCRF) at US DOE Princeton Plasma Physics Laboratory, 'Thermal radiation model in Rayleigh regime for ensemble of nanoparticles in gas and plasma', 2022 and 2024, Routine awards Role PI, collaborator: M. Shneider (Princeton University).**

**NSF I Corps Sites University of Akron, F19018 Deposition and Filtration Software, the Academic Lead, 2019-2021**

**US Army Ammunition Research, Development and Engineering Center (ARDEC): Die Face Cutting August 2016-August 2017 PI Sachin Jara Role co-PI responsible for CFD modeling**

**NSF I Corps Sites University of Akron, Co-PI, Team leader 'Vorticity Confinement to Better Predict Aerodynamic Drag', 2014-2017 (no summer support)**

**Weatherford Co. High Order of Approximation Modeling of Transient and Steady Processes in Drilling Environment, 2014-2015, Role PI**

**Meggitt Aircraft Braking Systems Corporation High Temperature Processing of Materials, PI Ed Evans (Chemical Engineering University of Akron), 2014-2015 Role co-PI responsible for CFD modeling**

**Amy Research Office (ARO): Vorticity Confinement Technique for Drag Prediction and Surface Interaction, 2012-2013, Role PI**

**Air Force Research Laboratory (AFRL): Implementation of Vorticity confinement, 2013, Role PI**

**Nano Gas Jet Production of Fibers, Fellowship for student Mikhailenko, PI, 2014**

**AFRL/Ohio DAGSI Student and Faculty Grant (with MSc students T. Snyder and K. Plesco), RB098 Drag Computation Using Vorticity Confinement, AFRL, Air Vehicles Directorate, 2009-2013, Role PI**

**AFOSR Modeling of Flow about Pitching and Flapping AT L Mitting A on Li**

**AFRL/Ohio DAGSI Student and Faculty Grant (with PhD student N Mullerix), PR 2006-4  
Modeling of Ablation Front Dynamics in Hypersonic Flight, AFRL Propulsion Directorate,  
2006-2009 Role PI**

**External Research Funding at Concordia University, Canada**

**Natural Sciences and Engineering Research Council of Canada (NSERC): Airframe Noise  
Prediction and Control Using CFD Techniques, Research Grant, April 2002-April 2006 Role  
PI**

**NSERC: Modeling of Aeroacoustic Noise in a Conical Nozzle (Asst. Prof. NSERC Summer  
Student Award for two undergraduate students, Role PI**

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### **Recognitions**

**Associate Fellow of AIAA (elected in January 2016)**

**Summer Air Force Awards (17 summer faculty awards in 2005-2024)**

**Summer Faculty Fellowship AFRL at WPAFB, Dayton, OH, 2019-2024, in 2021 with graduate  
student**

**Summer Faculty Fellowship Directed Energy AFRL at Kirtland AFB, New Mexico (2018)**

**Summer Faculty Fellowship AFRL at Eglin AFB, Florida (2016), with graduate student**

**Summer Faculty Fellowship US Air Force Test Facility, Edwards AFB, California 2014 and  
2015 (as a part of sabbatical leave (FIL))**

**Summer Faculty Fellowship AFRL at WPAFB, Dayton, OH, 2005-2009, 2011-2012, with  
graduate student in 2011-2012**

**Summer NASA Glenn Award June-August 2016 Turbomachinery Branch of NASA GRC**

### **International Awards**

**Visitor Program, Max Planck Institute for Physics of Complex Systems, Dresden, Germany, Fall  
2022, while at Faculty Improvement Leave (FIL) (aka sabbatical) in Fall 2022**

**Research Stay in The Hubert Curien Laboratory, LabHC UMR CNRS 5516 UMR Univ. Lyon**

**May-Aug 2002 Visiting Researcher**  
**School of Computational Science at Florida State University**  
**Host: Professor Youssef Husaini**

**Oct 2002 Visiting Researcher**

**11. 0807/2018 Sandia National Laboratories, Division of Aero Sciences, Albuquerque, NM**

**Maksim Mikhaylenko (PhD, graduated in December 2015, currently IT Program Manager - Scrum Master at IQVIA, Phoenix, Arizona, United States), PhD Dissertation "Development and Application of the Boundary Singularity Method to the Problems of Hydrodynamic and Viscous Interaction"**

**Kristopher Pleason (MSc, May 2014, current position research engineer with Tire Engineering Technology Group Harkock Tire & Technology, America Technical Center, Akron OH) MSc Thesis "Modeling of Turbulent Tip Vortices of Fixed and Rotating Wings using Vorticity Confinement Technique Coupled with Total Variation Diminishing"**

**Troy Snyder (MSc, 2012) MSc Thesis "A Coupled Wake Integral/Vorticity Confinement Technique for the Prediction of Drag Force"**

**Nathan Millerix (MSc, 2005, PhD, 2010 UA), current position Senior Research Engineer; GE Aviation, Cincinnati, OH PhD Thesis "Fully Coupled Model for High Temperature Ablation and a Reactive Kinetic Solver for its Solution"**

**Kedar Pathak (PhD, 2008, UA, current position Professor; Mechanical Engineering, Indian Institute of Technology, India). PhD Thesis "Computational Modeling of Plume Dynamics in Multiple Pulse Laser Ablation of Carbon"**

**Haish Gopalan (PhD, 2008, UA, current position Senior Scientist at NREL DOE USA; past position Senior Scientist at Institute for High Performance Computing, Singapore). PhD Thesis "Numerical Modeling of Aerodynamics of Airfoils of Micro Air Vehicles in Gust Environment"**

**Shuliang Zhao (PhD, 2010, UA, current position Carleton University, Ottawa, Canada, senior researcher). PhD Thesis "Development of Boundary Singularity Method for Partial-Slip and Transition Molecular Continuum Flow Regimes with Application to Filtration"**

**Tinghui Zheng (PhD, 2005, Concordia University, current position Professor; Sichuan University, Chengdu, China). PhD Thesis "The Effects of Vortex Profile on Sound Generation and Propagation in Nonuniform Flow"**

#### **Awards of research students under my advice**

- 1. In June 2022 graduate student Austin Watson received NSF sponsorship to attend Summer School on Lasers in Materials Science, Venice, Italy, July 2022 for Numerical Modeling of Laser Ablation of Boron**
- 2. In June 2022 graduate student Ahmad Sakib received NSF I-Corps Teams award for project "Delivery of coherent oxidant jet and nozzle manufacturing for girding technology", NSF 2230411, as an Entrepreneurial Lead (PI Povitsky).**
- 3. In summer 2021 Povitsky and graduate student Coryn Rabe received summer faculty and student award for 10 weeks summer research at Air Force Research Laboratory at Wright-Patterson AFB, Dayton OH**
- 4. In December 2019 Povitsky and graduate student Bauu received NSF I-Corps Sites University of Akron, F19018, Deposition and Filtration Software**
- 5. Student Jordan Ruffner was selected as a State of Ohio Ohio Space Grant Consortium Scholar in March 2020**
- 6. In March 2016 Povitsky and graduate student Pleason received a summer faculty and student award for 10 days and nights in March 2016**

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**Saurabh Pathak (Mechanical Engineering PhD Defense, March 2021)**  
**Ryanne Pinto Costa (Mechanical Engineering MSc Thesis defense, November 2020)**  
**Wenqi Li, (PhD Defense, Chemical Engineering June 2020)**  
**Hoonan Enayati (Mechanical Engineering PhD Defense, June 2019)**  
**Aladdin Ibrahimy (Mechanical Engineering MSc Thesis defense, November 2019)**  
**Fazad Ahmadi (Electrical Engineering PhD Defense, November 2018)**  
**Kristopher Pleson, Mechanical Engineering PhD Defense, February 2019)**





**20 S. Zhao(\*) and A. Poinso, A hybrid molecular and continuum method for low Reynolds number flows, Nonlinear Analysis: Theory, Methods & Applications Vol. 71,**



**45 A. Povitsky, Wavefront code friendly algorithm for compact numerical schemes,  
Applied Mathematics Letters, Vol. 14, No 4, pp 449-454, 2001, preliminary version  
ICASE Report 99-40 Research topics B, D**

**46 A. Povitsky and P. Morris, Parallel Compact Multi-Dimensional Numerical Algorithm**

**57 V. Arujunov and A. Povitsky, Calculation of a Confined Turbulent Jet with Modeling of its Ejecting Capacity, *Izvestia V.U.Z., Khimya Metallurgiya*, 1987, No 11, pp 107-110 (in Russian). Abstract in English in "Steel in the USSR", 1988, No 6 Role the corresponding author: Research topic C**

**58 V. Arujunov, A. Povitsky, G. Beemblumard V. Daeza, Improvement of Thermal Operation of Rotary Furnaces, *Stal*, 1991(11), pp 88-91 (in Russian). Role the corresponding author: Research topic C**

#### **Editorial articles**

**59 R. Melnik, A. Povitsky, and D. Srivastava, Mathematical and Computational Models for Transport and Coupled Processes in Micro and Nanotechnology, *Journal of the Nanoscience and Nanotechnology*, 8(7), 2008, pp 3626-3627**

**60 R. Melnik and A. Povitsky, A Special Issue on Modelling Coupled and Transport Phenomena in Nanotechnology, *Journal of Theoretical and Computational Nanoscience*, Vol. 3, Number 4, 2006**

**61 R. Melnik and A. Povitsky, Wave Phenomena in Physics and Engineering: New Models, Algorithms, and Applications, *Mathematics and Computers in Simulation* 65(45), 2004, pp 299-302**

#### **Papers submitted to journals/in revision**

**62 Hind Bana(\*) and Alex Povitsky, Selection of Die Shape for Manufacturing of Energetic Materials by CFD Modeling presently under revision requested by journal. Research Topic C**

#### **Papers Published in Refereed Conference Proceedings**

**63 A. Povitsky and J. Miller, AIAA-2021-4060 Computational model of supersonic airflow at ramp surface and comparison of wall heat flux to AFRL experiments, presented at the 2021 AIAA Aviation Forum Control ID# 402736**

**64 Sheikh Ahmad Sahib(\*) and Alex Povitsky, AIAA 2021-85879 Liquid Cocart Jet Breakup with Application to Grinding presented at the AIAA Region 3 conference, April 05-06 2021**

**65 M. Harich(\*) and A. Povitsky, Laser Ablation of Aluminum, International Conference on Multiscale Materials Modeling (MMM2022), October 2022, Symposium on Computer Modeling of Laser and Ion Beam Interactions with Materials**

**66 Sybil W. Ky, J. Miller and H. Bana(\*), Shock wave interaction with boundary layer at ramp surface, AIAA SciTech Forum, January 2023**





**94 A. Povitsky, T. Zheng(\*), and G. Vaistas, Effect of Vortex Profile on Sound Generation in a Nonuniform Flow, in Proceedings of ICCSA-2003, Lecture Notes in Computer Science 2668, pp 826-837, 2003 Research topic B**

**95 D. Loba(\*\*) and A. Povitsky, Single and Multiple Plume Dynamics in Laser Ablation for Nanotube Synthesis, AIAA Paper #2003-3923, July 2003 Research topic A**

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- 2** [arXiv:2301.08337 \[pdf\]](#) physics.flu.dyn Modeling of Chemical Vapor Infiltration Using Boundary Singularity Method Authors: Alex Povitsky, Patrick Mahoney, Feb 2023
- 3** [arXiv:2112.13154 \[physics.flu.dyn\]](#) Continuum and Molecular Modeling of Chemical Vapor Deposition over Nano-scale Substrates, Authors: H. Bauard and A. Povitsky, December 2021.
- 4** [arXiv:2008.00173 \[pdf\]](#) physics.flu.dyn Vorticity Confinement and IVD Applied to Wing Tip Vortices for Accurate Drag Prediction Authors: Kristopher Pleason, Alex Povitsky, 2020
- 5** [arXiv:1807.04896 \[pdf\]](#) physics.flu.dyn Mixing in 3D Cavity by Moving Cavity Wall, Author: Alex Povitsky, 2020
- 6** [arXiv:1704.00885 \[pdf\]](#) physics.flu.dyn Three dimensional flow in cavity with elevated helicity driven by parallel walls Author: Alex Povitsky, 2017