

ALEXANDER POVITSKY

CV and List of Publications (August 2021)

Full Professor (tenured)

AIAA Associate Fellow

**The University of Akron, Department of Mechanical Engineering with Aerospace Systems
Engineering program**

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Professional Preparation:

Moscow Institute for Steel and Alloys (MISIS), Moscow, Russia Present name: The National University of Science and Technology (MISIS)	Metallurgical Engineering Program in Engineering Cybernetics (similar to program in Computational Science in the US)	B.Sc./M.Sc. 1978-1984
Moscow Institute for Steel and Alloys, Moscow, Russia	Mechanical Engineering (CFD, Thermofluids, combustion)	Ph.D. 1984-1988
The Technion-Israel Institute of Technology, Haifa, Israel	Aerospace Engineering (CFD, parallel computing, combustion, aerodynamics)	Postdoc, 1991-1994

Ph.D. Title: Modeling of turbulent combustion and conjugate heat transfer in rotating furnace for processing of high-temperature materials

Appointments:

2017-till now Full Professor, Department of Mechanical Engineering (with undergraduate Aerospace Systems program), The University of Akron, Akron, OH

Address: Auburn Science and Engineering Center (ASEC), 101, The University of Akron
Akron, OH 44325-3903

2003 –2017 Associate Professor (tenured in 2009), Department of Mechanical Engineering, The University of Akron, Akron, OH

2001-2003: Associate Professor (tenure-track), Department of Mechanical and Industrial Engineering, Concordia University, Montreal, Canada

Address: 1455 De Maisonneuve Blvd. W. , Montreal, Quebec, Canada H3G 1M8

1997 – 2001: Senior Staff Scientist (since 1999), Staff Scientist (1997-1999), Institute for Computer Applications in Science and Engineering (ICASE) at NASA Langley Research Center, Hampton, VA.

Present name of ICASE is National Institute of Aerospace (NIA).

Address: 100 Exploration Way, Hampton, VA 23666

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, and (v) development of numerical model for phase change (sublimation) in hypersonic ablation

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 methods for micro- and nano- flows in transitional molecular-to-continuum regime with application to membranes, filtration, chemical vapor deposition and synthesis of micro- and nano- fibers and flow mixing in enclosures.

My research achievements in parallel computing include: (i) parallelization strategy for coupled continuum boundary singularity method and molecular direct simulation Monte-Carlo for nano- and micro- gas flows; (ii) development of processor scheduling algorithms for numerical solution of PDEs using implicit-in-time and compact high-order in space schemes; (iii) theoretical analysis of numerical stability for proposed sub-domain boundary conditions for implicit schemes.

My research in laser ablation include comprehensive model of laser irradiation shielding for multiple pulses in laser ablation for biological tissue (cornea), metals (for DoD purposes), carbon (for synthesis of nanotubes) and, combined crater development, heat transfer and phase change.

Current and Past External Financial Support at the University of Akron:

NSF I-Corps Sites University of Akron (*current*), F19-018 Deposition and Filtration Software, the Academic Lead, 2019-2021

US Army Armament Research, Development and Engineering Center (ARDEC): Die Face Cutting, August 2016-August 2017 PI Sadhan Jana. Role: co-PI responsible for CFD modeling.

NSF I-Corps Sites University of Akron, Co-PI, Team lead on "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.

Army 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 Mikhaylenko, PI, 2014.

AFRL/Ohio: DAGSI Student and Faculty Grant (with M.Sc. students T. Snyder and K. Pierson), RB09-8, Drag Computation Using Vorticity Confinement, AFRL, Air Vehicles Directorate, 2009-2013, Role: PI.

AFOSR: Modeling of Flow about Pitching and Plunging Airfoil Using High-order Schemes, FA9550-07-1-0314, 2007-2008 , Role: PI.

AFOSR: Modeling of Interactions of Ablated Plumes at Various Altitude of Flight, FA 9550-07-1-0457, FA9550-08-1-0485, 2007-2009 , Role: PI

AFRL/Ohio: DAGSI Student and Faculty Grant (with Ph.D. student N. Mullenix), 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 aeroacoustics and nano-manufacturing processes, NSERC Summer Student Award for two undergraduate students, Role: PI

Recognitions:

Associate Fellow of AIAA (elected in January 2016)

Summer Air Force Awards (14 summer faculty awards in 2005-2021)

Summer Faculty Fellowship, AFRL at WPAFB, Dayton, OH, 2019-2021

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, Turbo-machinery Branch of NASA GRC

International Award

US-Germany: DAAD Research Stay for University Academics to facilitate Visiting Appointment at German Aerospace Center “Deutsches Zentrum für Luft- und Raumfahrt” (DLR), Braunschweig, Germany, while on FIL in Fall 2015. Awarded 07/28/2015.

Consulting while at UA

IllinoisRocstar LLC., NAVY SBIR Phase 1: Development of Adaptive Vorticity Confinement Based CFD Methodology for Rotorcraft Applications (Phase 1), 2013-2014. Role: External consultant/University co-PI.

School of Professional Engineers (online teaching toward PE exams) 2011-till now

External and visiting positions prior to my appointment at the UA in 2003

May -Aug 2002 Visiting Researcher
School of Computational Science at Florida State University
Host: Professor Youssuf Hussaini.

Oct 2002 Visiting Researcher
Department of Mechanical Engineering, University of Colorado at Boulder
Host: Professor O. Vasiljev

May 2002- June 2003 affiliated member-collaborator
Centre de Recherche en Calcul Appliqué (CERCA), Montreal, Canada.

Jan 2001-May 2001 Associate Researcher
School of Engineering at Hampton University, Hampton, VA
Investigator in a project: "Corrugated and Composed Nozzles with Applications for Jet Noise Reduction", funded by NASA Glenn Research Center.

Aug 1996 - Oct 1996 Visiting Researcher, Department of Mechanical Engineering
University of Manchester Institute of Science and Technology (UMIST), UK
Host: Prof M. Leschziner. Funded by Royal Society and Israel Academy of Science.

Internal Grants at the University of Akron:

2018 and 2019, The ME Advisory Council funding for faculty-initiated senior design projects, \$600 each.

Firestone Award: 2005, 2008

Summer Faculty Research Grant: 2004, 2005

Invited research presentations (last six years):

1. 12/11/2015 Technical University Braunschweig, Braunschweig, Germany. Host Prof. Dr.-Ing. Rolf Radespiel, Institute of Fluid Mechanics, Technische Universität Braunschweig.
2. 12/2/2015 Max Planck Institute for Dynamics and Self-Organization, Göttingen, Germany. Host Prof. Dr. Eberhard Bodenschatz, Head of Fluid Dynamics Laboratory.
3. 11/28/2015 Fraunhofer Institute for Industrial Mathematics (ITWM), Host Prof. Dr. Oleg Iliev, Department of Flow Simulation, Kaiserslauten, Germany.
4. 11/23/2015 German Aerospace Center (DLR), Braunschweig, Germany. Host Dr. Thino Eggers, Head of Space Engineering group.

5. 10/14/2015 California Institute of Technology (CalTech), Department of Mechanical Engineering. Host: Prof. Tim Colonius.
6. 10/05/2015 NASA Ames Research Center, Moffett Field, California. Host Dr. Cetin C. Kiris, Computational Aerosciences Branch Chief at NASA Advanced Supercomputing (NAS) Division.
7. 10/09/2015 San Diego State University, Host Prof. Jose Castilio, Head of Computational Science Research Center.
8. 08/05/2015 NASA Glenn Research Center, Turbomachinery Branch (in frame of my summer faculty research fellowship).
9. 06/02/2016 Optimization of Lateral Jets for Guidance of Supersonic Rockets, Eglin AFB, Shalimar, FL (in frame of my summer Air Force Fellowship).
10. 07/26/2016 4th Annual Meeting of the AFRL Mathematical Modeling and Optimization Institute, University of Florida, Research and Engineering Education Facility (REEF).
11. 08/07/2018 Sandia National Laboratories, Division of Aero Sciences, Albuquerque, NM, Hosts: David Kuntz and Justin Smith.
12. 07/24/2018, Laser Ablation Modeling Group, Ball Aerospace, Albuquerque, NM, Host: Ryan Lane.
13. 8/2/2018, AFRL/RDLE Pulsed Laser Effects Workshop, Albuquerque, NM, Host: Shane Johnson.
14. 03/17/2017, NASA Glenn Research Center /Vantage Partners, LLC Host: Gustavo Costa, Ph.D.
15. 8/9/2018, AFRL, Directed Energy Directorate, Laser ablation and plume shielding effect (presentation of my summer Air Force Fellowship), Kirtland Air Force Base, Albuquerque, NM, Host: Tim Madden.
16. 10/24/2019, Mixing at low gravity in enclosure, NASA SLPSRA Fluid Physics Workshop, NASA Glenn Research Center, October 2019.
17. 11/16/2020, Analysis of Hydroplaning for Conventional and Spherical Tires, CenTiRe NSF and industry consortium, Virginia Tech. Host: Greg Bunting.
18. 08/19/2020, Modeling of Plume Shielding Effect in Laser Ablation, DOE Plasma Propulsion Lab and Princeton University, Host Dr. Y. Raitses, head of Facility.
19. 07/07/2021, Hybrid Continuum and Molecular Modeling for Air Filtration, presentation for US Army, host S. Jana.
20. 04/13/2021, Modeling of filtration and vapor deposition, MATH2MARKET GmbH, Hosts Dr. Philipp Eichheimer.
21. 06/03/2021, Hypersonic Modeling, The University of Kansas, host: professor Chris Depcik.

Current Ph. D. advisor for: Ahmad Sakib (started in August 2021)

Current M.Sc. advisor for: Corryn Rahe (expect to graduate in summer 2022), Austin Watson (starts in Fall 2021)

Graduated Ph.D. (6) and M.Sc. (6):

Himel Barua (M.Sc. 2016, Ph.D., graduated in summer 2021 current position: postdoctoral researcher, Oak Ridge National Lab, USA), Ph.D. Thesis: Modeling of Chemical Vapor Deposition

Akshay Pakala (M.Sc., graduated in Fall 2020), M.Sc. Thesis: Aerodynamic Analysis of Conventional and Spherical Tires.

Maxwell Hanich (M.Sc., graduated in summer 2020, current position: R&D Engineer, US Navy), M.Sc. Thesis: Analysis of Efficiency of Laser Ablation of Aluminum with Modeling of the Shielding Effect.

Maxim Mikhaylenko (Ph.D., graduated in December 2015, currently Head of Project Management Office at IQVIA, Moscow, Russian Federation), Ph.D. Dissertation: “Development and Application of the Boundary Singularity Method to the Problems of Hydrodynamic and Viscous Interaction.”

Kristopher Pierson (M.Sc., May 2014, current position: research engineer with Tire Engineering Technology Group, Hankook Tire & Technology, America Technical Center, Akron OH) M.Sc. Thesis: “Modeling of Turbulent Tip Vortices of Fixed and Rotating Wings using Vorticity Confinement Technique Coupled with Total Variation Diminishing.”

Troy Snyder (M.Sc., 2012, current position: Ph.D. student at the University of Akron) M.Sc. Thesis: “A Coupled Wake-Integral/Vorticity Confinement Technique for the Prediction of Drag Force.”

Nathan Mullenix (M.Sc., 2005, Ph.D., 2010, UA), current position: Senior Research Engineer, GE Aviation, Cincinnati, OH. Ph.D. Thesis: “Fully Coupled Model for High-temperature Ablation and a Reactive-Riemann Solver for its Solution.”

Kedar Pathak (Ph.D., 2008, UA, current position: Associate Professor, Navrachana University, India). Ph.D. Thesis: “Computational Modeling of Plume Dynamics in Multiple Pulse Laser Ablation of Carbon”.

Harish Gopalan (Ph.D., 2008, UA, current position: Senior Scientist at Institute for High-Performance Computing, Singapore). Ph.D. Thesis: “Numerical Modeling of Aerodynamics of Airfoils of Micro Air Vehicles in Gusty Environment.”

Shunliu Zhao (Ph.D., 2010, UA, current position: Carleton University, Ottawa, Canada, senior researcher). Ph.D. Thesis: “Development of Boundary Singularity Method for Partial-Slip and Transition Molecular-Continuum Flow Regimes with Application to Filtration.”

Tinghui Zheng (Ph.D., 2005, Concordia University, current position: Professor, Sichuan University, Chengdu, China). Ph.D. Thesis: “The Effects of Vortex Profile on Sound Generation and Propagation in Non-uniform Flow.”

Research awards of research students under my advice:

1. In summer 2021 Povitsky and graduate student Corryn Rahe received summer faculty-and-student award for 10 weeks summer research at Air Force Research laboratory at Wright-Patterson AFB, Dayton OH.
2. In December 2019 Povitsky and graduate student Barua received NSF I-Corps Sites University of Akron, F19-018, Deposition and Filtration Software.
3. Student Jordan Ruffner was selected as a State of Ohio/Ohio Space Grant Consortium Scholar in March 2020.
4. In March 2016, Povitsky and graduate student Pierson received summer faculty-and-student award for 10 weeks summer research at Air Force Research laboratory at Eglin AFB.
5. In February 2016, graduate student Pierson is awarded 2016 Akron Engineer Award by Northeastern Ohio AIAA chapter for his M.Sc. research in vorticity confinement and AIAA publications.

6. In April 2014, M. Sc. student Pierson got the 3rd place in the Midwestern AIAA students' conference.
7. In 2012, Ph.D. student Mikhaylenko received NSF travel award to attend Boundary Element Method" workshop.
8. Ph.D. student Mullenix has received the best presentation award at the AIAA symposium in the Computational Methods Group in 2010. Also he was cited by Ohio Aerospace Institute for presenting his research at the 15th International Space Planes and Hypersonic Systems Conference in May 2008.
9. Graduated Ph.D. student Pathak won four Young Investigator travel awards to attend the NASA GRC/Rice University Workshop on Synthesis of Nanotubes in April 2007, the 5th International Conference on Photo-Excited Processes and Applications (ICPEPA-5) in September 2006, the 3rd MIT Conference of Computational Solid and Fluid Mechanics, June 2005, and the Conference on Analysis, Modeling and Computation of PDE and Multiphase Flow, celebrating the 70th birthday of Professor James Glimm, SUNY Stony Brook, August 2004.

Supervision of postdoctoral fellows:

Mona Golbabaie (2014-2016, postdoctoral fellow, funded by Weatherford, current position: Research engineer, Momentum Space, CA USA)

Igor Zinovik (2005, current position: senior research scientist, Philip Morris, Switzerland)

Diomar Lobao (2002-2003, current position: Professor, Universidade Federal Fluminense-UFF, RJ, Brazil)

Avijit Chatterjee (1996-1997, current position: Professor, Department of Aerospace Engineering, IIT Bombay, India)

Courses taught (The University of Akron, Concordia University (Montreal), The Technion)

Undergraduate: Dynamics, Fluid Dynamics-1, Fluid Dynamics-2, Aerodynamics of Wings, Foundations of Design (numerical optimization part), Heat Transfer, Engineering (Numerical) Analysis 1 and 2, Algorithms in C++, Senior Design Project (mechanical and aerospace), ME Lab (aerodynamics of multi-element wing in Wind Tunnel).

Graduate and undergraduate: Gas Dynamics, Compressible Fluid Flow, Introduction to CFD

Graduate: CFD-1, CFD-2, Dynamics of micro- and nano- flows, Combustion, Heat Transfer

Development of new courses at The University of Akron:

- (a) I developed and taught a new *Undergraduate Mechanical Engineering Lab*, to study lift and drag force exerted on subsonic multi-element MAV wings. I set-up a new subsonic wind tunnel, designed model wings, wrote experiments, and developed a FLUENT-based simulation tool.
- (b) I proposed, developed and taught a new graduate course *_Micro- and Nano- Fluid Dynamics 4600:655* that has been approved and included in the University curriculum.
- (c) Current development of transonic aerodynamic experiment for Compressible Fluid Flow class and ME Lab
- (d) Developed *online classes Fluid Dynamics-2, CFD-1, and Compressible Flow* in 2020-2021 for teaching during COVID-19

Senior Design / Honors projects under my advice (last 4 years)

2021-2022: Oblique Shock Wave Diffuser, Honors project

student Noah Riggerbach (ME)

2020: Shock Wave/Boundary Layer Interactions

ME Students: Corryn Rahe, Blake Keuchel and Lauren Andrews (all Honors)

2020:ASE Supersonic Propulsion Inlet Optimization and Shockwave/Boundary Layer Interaction

ASE Students: Lucas Fulop, Jordan Ruffner, Ian Henry and Anthony McMullen (all Honors)

2019: Laser Ablation of Aluminum

students: Erika Nosal, Zachary Rahe (Honors SD), and Arthur Pamboukis

2018: Optimization of Lateral Jets for Guidance of Supersonic Rockets

students Mike Dadante, Travis Jennings, Jillian Olson and Vittorio Valletta

2017:Optimization of Lateral Jets for Guiding Supersonic Missiles

students Samuel Rhoades, Emily Slovan and Anne Pirie (Honors SD)

Service for Professional Community:

I was panelist and reviewer of proposals submitted to the NASA Research Announcement “Use of the NASA Physical Sciences Informatics System”, May 2020.

I was a mentor AIAA student member Mr. John Lightfoot (senior at Cleveland State University), 2015-2017.

I was a Session Chair at AIAA Computational Fluid Dynamics Conference, San Diego, CA, June 2013

I was a Session Chair (Modeling and Simulation of Micro- Fluids) at American Filtration Society conference, AFS-2010, San Antonio, TX, March 2010.

I was a Session Chair (Fluid Dynamics of Materials’ Processing) in American Physical Society DFD Conference, 2010.

I was a guest journal editor in “Journal of Nanoscience and Nanotechnology” (2008) , “Mathematics and Computers in Simulations” (2004) and “Theoretical and Computational Nanoscience” (2006).

I co-organized the Workshop “Modeling of Transport Phenomena in Nanotechnology” at the World Congress in Computational Mechanics, Los Angeles, CA, July 2006, 25 participants.

I am a member of the steering committee of the annual MUFMECH (Midwestern Universities Fluid Mechanics Retreat) and the University of Akron representative there.

I am a reviewer for Physics of Fluids, AIAA J., J. of Theoretical and Computational Fluid Dynamics, Aerospace Science and Technology, Physica A, J. of Applied Physics, Computers and Fluids, Heat and Mass Transfer, Journal of Computational Acoustics, Building and Environment, Applied Numerical Mathematics, J. of Nanoscience and Nanotechnology, J. of Mathematical Physics, Journal of the Atmospheric Sciences, Physics Letters A, IMECE, NanoLetters, Journal of Aerospace Engineering, The Aeronautical Journal (Royal Society), Scientia Iranica, ASME Journal of Heat Transfer, Journal of Physics D, Journal of Scientific Computing, and Chemical Physics Letters.

I was a reviewer of proposals for ARO, NSF, NASA, Canadian NSERC and Israel Science Foundation (Canadian and Israeli analogues of NSF).

Service for University:

I am a faculty advisor for University of Akron AIAA Chapter, from 2019

Member of University Wide Appeals Committee, 2021-2024, elected by College of Engineering

Member of University-wide Graduate Council (2018-2024)

Member of University-wide Faculty Research Committee (2011 -2017)
Member of University-wide Graduate Curriculum Committee (2014-2017)
Member of College of Engineering faculty committee to purchase of the computer cluster, 2020
ME Liaison for local AAUP chapter (2015-2020)
Chair of Retention, Tenure and Promotion Committee, Department of Mechanical Engineering (2009-2010, 2018-2019, 2020-2021)
Member of Department Search Committee (2012-2014, 2017-2018)
Member of Graduate Program Revision Committee, Department of Mechanical Engineering (2009-2010)
Member of ME Graduate Studies Committee (2011- till now)

Mentoring:

2019 Mentored Assistant Professor Dr. Amir Nourhani and Lecturer (graduate student) Himel Barua in teaching of Fluid Dynamics-1 undergraduate class

Pre-college activities:

Interviewer of Honors High School students (2006-till now)
Judge for the 60th annual Akron Public Schools' Science Technology, Engineering and Math EXPO, January 30, 2016
Super judge for WRD5 Science Day at University of Akron (March 2014)
Judge at State Science Day, Columbus, OH, May 2014
New Student Orientation (NSO) advisor for freshman ME and ASE, from 2015

Member of Graduate Committees for M. Sc. and Ph.D. applicants at the University of Akron:

Michael Kelly (Mechanical Engineering, MSc Thesis defense, July 2021)
David Hirt (Mechanical Engineering, Ph. D. Thesis Proposal, July 2021)
Garrett McHugh (Mechanical Engineering, Ph.D Thesis Proposal, May 2021)
Saurabh Pathak Mechanical Engineering Ph.D. Defense, March 2021)
Rayanne Pinto Costa (Mechanical Engineering, MSc Thesis defense, November 2020)
Wenqi Li, (Ph.D. Defense, Chemical Engineering, June 2020)
Hooman Enayati (Mechanical Engineering, PhD Defense, June 2019)
Alaaddin Ibrahimy (Mechanical Engineering, MSc Thesis defense, November 2019)
Farzad Ahmadi (Electrical Engineering, Ph.D. Defense, November 2018)
Kristopher Pierson, Mechanical Engineering, Ph.D Defense, February 2019)
Gautam, Prashanta (Mechanical Engineering, M.Sc. Thesis defense, October 2017)
Manzo, Gabriel (Chemical Engineering, Ph.D. Defense, December 2015)
Craig Laukiavich (Mechanical Engineering, Ph.D. Defense, December 2014)
Yang Xi (Chemical Engineering, Ph.D. Defense, April 2016)
Suma Rama Das (Mechanical Engineering, M.Sc. Thesis defense, October 2016)
Abbas Rahimi (Civil Engineering, Ph.D. Thesis Defense, February 2015)
Dipankar Biswas (Mechanical Engineering, Ph.D. Thesis Defense, November 2014)
Ana Balasiou (Mechanical Engineering, Ph.D. Defense, October 2012)
Stefan Moldovan (Mechanical Engineering, Ph.D. Defense, February 2013)
Andrew Guarendi Mechanical Engineering, M. Sc. Defense, January 2013)
Sarfaraz Patel (Chemical Engineering, Ph.D. Defense, 2013)
Frank Horvat (Mechanical Engineering, Ph.D. Defense, May 2012)
Dipin Kalapurakal (Mechanical Engineering, M.Sc. Defense, June 2012)
Nicholas Garafolo (Mechanical Engineering, Ph.D. Defense, March 2010)
Joshua Johnson (Engineering Applied Math PhD program, Ph.D. Thesis Defense, October 2010)

Yan Zhang (Civil Eng, Ph.D. Thesis Defense, November 2010)
 Bharath Kumar (Chemical Engineering, Ph.D. Defense, July 2010)
 Anil Bhari (Mechanical Engineering, M.Sc. Defense, November 2010)
 Zhenpeng Qin (Mechanical Engineering, M.Sc. Defense, April 2009)
 Changhu Xing (Mechanical Engineering, Ph.D. Defense, June 2009)
 Jianhua Dai (Electrical Engineering, Ph.D. Defense, April 2009)
 Dingfeng Deng (Mechanical Engineering, Ph.D. Defense, January 2007)
 Song Liu (Mechanical Engineering, M. Sc. Defense, April 2007)
 Mohammad Faizan (Mechanical Engineering, Ph.D. Defense, October, 2007)
 Sun Feng (Mechanical Engineering, Ph.D. Defense, October 2007)
 Joe Mandi (Mechanical Engineering, M. Sc. Thesis Defense, April 2005)
 Peter (Zheng) Zhang (Mechanical Engineering, M. Sc. Thesis Defense, October 2005)
 Atanas Gagov (Polymer Engineering, Ph.D. Defense, October 2007)

List of Publications

ALEX POVITSKY (August 2021)

Research topics:

A-interactions of shock waves, laser/plasma ablation and hypersonic ablation

B-high-order schemes, vorticity confinement, aeroacoustics, wave propagation in oil drilling mud, and unsteady aerodynamics of micro air vehicles

C-combined molecular and continuum methods for micro- and nano- flows, numerical modeling of flow mixing in enclosures, chemical vapor deposition, synthesis of nanotubes, manufacturing of energetic materials and combustion

D-parallel algorithms for CFD

Status of co-authors:

(*) graduate student under my advice

(**) postdoctoral fellow under my advice

(u) undergraduate student under my advice

Journal Publications

1. A. Povitsky and K. Pierson (*), Vorticity Confinement Applied to Accurate Prediction of Convection of Wing Tip Vortices and Induced Drag, International Journal of CFD, Volume 35 Issue 3, Pages 143-156, 2021. published online 12-15-2020, <https://doi.org/10.1080/10618562.2020.1856822> Research Topic: B
2. A. Povitsky, Mixing in three-dimensional cavity by moving cavity walls, Journal of Theoretical and Computational Fluid Dynamics, Vol. 34, pp. 593–617 2020. DOI: <https://doi.org/10.1007/s00162-020-00535-x> Research Topic: C
3. A. Povitsky and K. Pierson (*), Combined Vorticity Confinement and TVD Approaches for Accurate Vortex Modelling, International Journal of Computational Fluid Dynamics,

2020, Vol. 34, No. 9, pp. 633–643, <https://doi.org/10.1080/10618562.2020.1805105>
Research Topic: B

4. H. Barua (*) and A. Povitsky, Numerical Model of Carbon Chemical Vapor Deposition at Internal Surfaces, Vacuum, Volume 175, May 2020, 109234, <https://doi.org/10.1016/j.vacuum.2020.109234>. Research Topic: C
5. M. Golbabaee-Asl (**), A. Povitsky and L. Ring, Modeling of Wave Propagation in Drilling Fluid, ASME Journal of Offshore Mechanics, Vol. 140(4), p. 041304, Apr 2018, Research topic: B.
6. A. Povitsky, Three-dimensional flow with elevated helicity in driven cavity by parallel walls moving in perpendicular directions, Physics of Fluids, 29, 083601 (2017); <http://doi.org/10.1063/1.4996179>. Research Topic: C
7. M. Mikhaylenko(*) and A. Povitsky, Combined Boundary Singularity Method and Finite Volume Method with Application to Viscous Deformation of Polymer Film in Synthesis of sub-Micron Fibers, Engineering Analysis with Boundary Elements (EABE), Vol. 83, 2017, pp. 265-274. Research topic: C. Role: the corresponding author.
8. N. Mullenix(*) and A. Povitsky, Hypersonic Ablation of Graphite Thermal Protection Systems with Surface Defects, AIAA J. of Spacecraft and Rockets, Vol. 53, Issue 5, pp, 912-929, 2016. Published online July 18th 2016. Research Topics: A,D.
9. T. Snyder(*) and A. Povitsky Far-field Induced Drag Prediction Using Vorticity Confinement Technique, AIAA J. of Aircraft, Vol. 51, issue 6, pp. 1953-1958, 2014 <http://arc.aiaa.org/doi/abs/10.2514/1.C032719>, Role: the corresponding author. Research topic: B.
10. M. Mikhaylenko(*) and A. Povitsky, Optimal Allocation of Boundary Singularities for Stokes Flows about Pairs of Particles, Engineering Analysis with Boundary Elements (EABE), Vol. 41, pp. 122-138, 2014. Role: the corresponding author. Research topic: C.
11. S. Zhao(*) and A. Povitsky, Coupled Continuum and Molecular Model of Flow through Fibrous Filter, Physics of Fluids, Vol.25, Issue #11, 112002, November 2013. Role: the corresponding author. Research topics: C and D.
12. S. Zhao(*) and A. Povitsky, Hybrid Continuum-molecular Modeling of Fibrous Filtration Flows in the Transition Flow Regime, Journal of Coupled Systems and Multiscale Dynamics, Issue 2, Vol. 1, 2013, pp. 251-264, Role: the corresponding author. Research topics: C and D, <http://www.aspbs.com/jcsmd/>
13. S. Zhao(*) and A. Povitsky, Three-dimensional boundary singularity method for partial slip flows, Engineering Analysis with Boundary Elements, 2011, **35**(1), p.114-122. Role: the corresponding author. Research topic: C.
14. H. Gopalan(*) and A. Povitsky, Lift Enhancement of Flapping Airfoils by Generalized Pitching Motion, AIAA J. of Aircraft, Vol. 47, No. 6, pp. 1884-1994, November–December 2010. Research Topic: B

15. A. Povitsky, K. Pathak(*), and D. Gaitonde, Dynamics of Plumes Generated by Local Injection of Ablated material, AIAA Journal, Vol. 47, No. 3, pp. 655-668, 2009. Role: the corresponding author. Research topic: A.
16. S. Zhao(*) and A. Povitsky, Boundary Singularity Method for Partial Slip Flows, Int. Journal for Numerical Methods in Fluids, Vol. 61, 2009, pp. 255-274. Role: the corresponding author. Research topic: C.
17. H. Gopalan(*) and A. Povitsky, Stream Function-Potential Function Coordinates for Aeroacoustics and Unsteady Aerodynamics, Int. Journal of Computational Fluid Dynamics, Vol. 23, No. 3, pp. 285-290, 2009. Role: The corresponding author. Research topics: B and D.
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