TUGBA PISKIN

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EDUCATION

Purdue University, School of Aeronautics and Astronautics Aug. 2015 – Dec. 2019
Ph.D. in Aerodynamics
Dissertation: Numerical Simulations of Gas Discharges for Flow Control Applications

Middle East Technical University, Aerospace Engineering Sep. 2012 – Jul. 2015
MS in Aerodynamics
Thesis: Analysis of Weakly Ionized Hypersonic Flows

Middle East Technical University, Liberal Art & Science Sep. 2008 – Dec. 2011
BS in Physics
Majored in Solid State Physics and Test & Measurements

RESEARCH INTERESTS

Plasma Physics, Computational Fluid Dynamics, Aerodynamics, Hypersonic Flow, Parallel Computing, Plasma Chemistry, Aerothermodynamics, Optimization, Test and Measurement, Solid State Physics, Semiconductors

COMPUTER SKILLS

Operating Systems:	UNIX/ LINUX, WINDOWS
Programming:	Fortran, Python, C/C++, MPI, OpenMP CATIA, LabView, Microsoft Office POINTWISE, TECPLOT, MATHCAD, COMSOL, LATEX, MATLAB, HTML PowerDELTA, PowerFLOW, PowerVIZ, PowerINSIGHT, DesignGuide, and HPEM.

EXPERIENCE

Postdoctoral Research Scholar, University of Michigan Jan. 2021 - Current

- Updated the solver (HPEM) to include the electron energy from non-electron impact processes to capture the physics of EUV systems. (Funded project by Samsung Electronics)
- Computationally investigating the E-H transitions in inductively coupled plasmas to improve performance of microelectronic etching devices (Funded project by National Science Foundations)
- Selected for training: 2nd Computational Physics School for Fusion Research (MIT) and Plasma Spectroscopy: The Full Spectrum from X-rays to Radio Waves (ICOPS 2021, grant received), Plasmas for Space Propulsion (ICOPS 2022, grant received)

Assistant Professor, Middle East Technical University, Turkey Jan. 2020 - Jan. 2021

- Responsible to teach and prepare the content for 9 credit per semester, to establish research group and study, and to serve in academic boards.
- Taught Aerodynamics I and II (ASE 341/342 -62/50 students), Numerical Methods for Aerospace Engineering (ASE 301 - 49 students), Hypersonic Flow (ASE 445 - 20 students), ESC 492 (Multidisciplinary Engineering System Implementation - 8 students), Introduction to Rocket Technologies (ASE 442 - 45 students), and Statics (ASE 261- 69 students).
- Mentored four undergraduate students to do research about CFD (by using SU2, Paraview, Gmesh) and artificial intelligence.
- Prepared laboratory sessions (experiments and lab documents) for Aerodynamics course.

Aerodynamics Application Engineer Intern- Dassault Systemes, USA May 2019 - Dec.2019

- Investigated the effects of the 3-D design optimizations to improve drag performances of cars in real environment flows - simulated at Cloud environment.
- Studied the effects of particles (water, dirt, and mud) in the flow behavior in terms of design optimization and for camera and sensor safety in cars
- Reduce the drag coefficients 62 counts by using design of experiment optimization. · Reduced the computational cost around 2000 CPU hours from 10000 CPU hours.
- Completed 5 different design optimization study by cooperating with other teams: racing-car geometry, aerodynamics-thermal, aerodynamics-soiling, aerodynamics-noise, and late stage design studies.

Research Assistant- Purdue University, USA Aug. 2015- Aug. 2018

- Developed numerical solver for 1D glow discharges and pulse discharges by considering stiff nature of discharge physics and thermally non-equilibrium species.
- Improved the code with different numerical models: mesh clustering, multiple time steps, multi grid and iterative solvers and approaches to decrease computational cost 100 − 1000 times ·
- Studied plasma chemistry to achieve successful comparisons with the experimental data to fill the void in the field.
- Combined BOLSIG+ solver and LxCAT database with my solver to achieve correct description of transport properties and reaction rates
- Validated results, presentations, and scientific papers to present findings

Graduate Teaching Assistant & Instructor, Purdue University Aug. 2017 - Jan. 2019

- Developed an instructional plan for the summer course and ensured that it meets departmental standards
- Planned lessons and assessed students' progress by grading tests, assignments, and class activities
- Held office hours to answer questions to increase understanding of aerodynamics, to help coding problems about SU2, Pointwise, C#, the usage of clusters and LINUX environment
- Graded assignments and exams to facilitate materials covered in class.

Research Assistant, Middle East Technical University, Turkey May 2013 - Jul. 2015

- Developed 3D flow field solver for 'Analysis and Design Optimization of Hypersonic Flow' project founded by Scientific and Technological Research Council of Turkey
- Constructed geometry and mesh by using CATIA and POINTWISE, respectively
- Investigated different numerical algorithms, numerical requirements, and physicochemical processes to clarify the computational cost
- Modeled nonequilibrium chemistry and thermodynamics to achieve the same physical conditions as in reentries
- Optimized geometry by using adjoint design optimizations to decrease temperature load and heating rate
- Presented results as a form of technical reports, presentations, and scientific papers to share the findings

SERVICE

- American Vacuum Society, Michigan Chapter, Executive Committee Member March 2021- Current
- Session Chair at International Conference on Plasma Science May 22-26, 2022
- Session Chair at Gaseous Electronics Conference October 4-8, 2021
- Reviewer for Solid State Electronics Journal, AIAA Journal, Journal of Thermal Science and Technology
- **Member:** American Physics Society (APS), the American Institute of Aeronautics and Astronautics (AIAA), American Vacuum Society (AVS), the Institute of Electrical and Electronics Engineers (IEEE)

SELECTED PUBLICATIONS & TALKS

1. **Piskin, T.,** Podolsky, N., Macheret, S., and Poggie, J., '*Challenges in Numerical Simulation of Nanosecond-Pulse Discharges*', Journal of Physics D: Applied Physics, 7 May 2019. doi:10.1088/1361-6463/ab1fbe
2. Oztiryaki, F. and **Piskin, T.**, '*Airfoil Performance Analysis Using Shallow Neural Networks*', 2021 AIAA SciTech Forum, Nashville, USA, Jan 11 -15, 2021. https://doi.org/10.2514/6.2021-0174
3. **Piskin, T.,** S. O. Macheret, and J. Poggie, '*Effect of Local Field Approximation in Simulations of Gas Discharges'*, AIAA 2019-3356, June 2019. https://doi.org/10.2514/6.2019-3356
4. **Piskin T.,** Eyi, S., and Yumusak, M. '*Analysis and Design Optimization of Blunt Bodies in Weakly Ionized Hypersonic Flow'*, AIAA Paper 2014-3255, 32nd AIAA Applied Aerodynamics Conference, AIAA Aviation and Aeronautics Forum and Exposition 2014, Atlanta, Georgia, USA, 16-20 June 2014. https://doi.org/10.2514/6.2014-3255
5. **Piskin, T.,** Qian, Y., Pribyl, P., Gekelman, W., and Kushner, M.J., '*E-H Transitions in Ar/O2 and Ar/Cl2 Inductively Coupled Plasmas- Modeling*', ICOPS, 49th International Conference on Plasma Science, Seattle, WA USA, May 22-26, 2022.
6. **Piskin, T.,** Lee, H. Nam, S.K., Kushner, M.J., '*EUV Induced Formation of Hydrogen Plasmas at Low Pressure*', AVS 2021, Charlotte, NC, 24-29 October 2021.
7. **Piskin, T.,** Qian, Y., Pribyl, P., Gekelman, W. N., and Kushner, M. J., '*E-H Transitions in Ar/O2 and Ar/Cl2 Inductively Coupled Plasmas for Varying Antenna Aspect Ratio – Modeling*', GEC 2021, Virtual, 4- 8 October 2021.
8. **Piskin, T.,** Qian, Y., Pribyl, P., Gekelman, W. N., and Kushner, M. J., '*Consequences of photodetachment in pulsed Ar/O2 and Ar/Cl2 inductively coupled plasmas*', GEC 2021, Virtual, 4- 8 October.
9. **(INVITED)** Poggie, J., Macheret, S., **Piskin, T.**, Podolsky, V., '*Challenges in Numerical Simulation of Nanosecond-Pulse Discharges*', Plasma Aerodynamics Discussion Group (based on Journal of Physics D Special Issue) AIAA SCITECH, January 2020, Orlando, FL, USA.
10. **(INVITED) Piskin, T.** and Eyi S., '*Analysis of Hypersonic Non-Equilibrium Reentries with Newton-GMRES Method*', IPPW2015- 3207, 12th International Planetary Probe Workshop, Cologne, Germany, 15-19 June 2015

LEADERSHIP EXPERIENCE

Purdue Graduate Student Government (PGSG) Senator — May 2017 - Aug. 2018

- Senator for Purdue AAE-- Improved the communication between graduate students and the Purdue University administration to enforce a better graduate school experience
- Organized the Next Generation Scholar 2017 for 200 local middle and high school students, and 'The Big Grad Event' - to increase Purdue students' engagement with local community and service mentality

AeroAssist Executive Committee Member and Fund-raising Chair — May 2017 - May 2019

- Lobbied to increase graduate student experience in the School of Aeronautics and Astronautics
- Shared important events and deadlines and encouraged graduate students to be connected and active
- Judged 25 presentations at the Research Symposium Series for the department's students to prepare them professional conferences
- Organized events to increase the budget of the student organizations by 10%
- Attended to panels to help and to answer the questions from follow graduate and undergraduate students

Alternative Energy and Technology Community – Executive Member/Vice President 2008 -2014

- Improved the solar car to achieve more acceleration in terms of aerodynamic design and battery power with CAE
- Trained incoming members and planned workshops, conferences, and seminars to increase awareness
- Collected wind data on the campus to build small wind turbines to increase renewable energy usage

COMMUNITY & OUTREACH

- Mentor for OptiMIze organization, University of Michigan — Sept. 2021- Current
- Judge for Undergraduate Research Symposium, University of Michigan — April 2021
- Invited talks at high school to talk about aerospace engineering (Bursa Anadolu High school and Success High Schools, Turkey) — May & Oct. 2020
- Invited Panelist for Women in Workspace by Society of Women Engineers, Middle East Technical University — March 2020
- Invited Speaker (Cars and Aerodynamics) for Aerospace Engineering Day by Aerospace Society, Middle East Technical University — March 2020
- Head Volunteer for Lafayette Symphony Orchestra — Aug. 2015 - 2019
- Judge for Undergraduate Research Symposium High School Research Fairs, and Klondike Middle School Science Fair as a member of Purdue University — 2015 - 2019
- Women in Engineering, WiE, Purdue University, Member and Activity Leader — 2016-2019
- Women in High Performance Computing, WHPC, Purdue University, Member — 2017-2019
- SMAP (Saturday Morning Astrophysics) NASA Project Volunteer and Activity Leader, Purdue University — Oct. 2015- May 2016
- Boiler Out Volunteer Member, Purdue University community service projects for Outreach, Understanding, and Teamwork — 2015- 2016

AWARDS & SCHOLARSHIPS

- 2019 Estus H. and Vashti L. Magoon Award for Excellence in Teaching Awards — Apr. 2019
- Scientific and Technological Research Council of Turkey (TUBITAK) Scholarship — May 2013- 2015
- Travel Scholarships from TUBITAK for two technical conferences — Jun. 2014 - Aug. 2014
- Middle East Technical University Scholarship — Sep. 2008 - Jan. 2012
- Dean's High Honor List — Jan. 2011 - 2012

HOBBIES

Stargazing, stand-up comedy, and martial arts.