

# Mohammad Afzal Shadab

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## EDUCATION

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**Doctor of Philosophy** | *Computational Science, Engineering & Mathematics* Aug 2019 – June 2024 (Expected)  
The University of Texas at Austin, United States GPA: 3.90/4.0

*Title:* Modeling Subsurface Flow of Water in Earth and Planetary Sciences

*Advisor:* Dr. Marc Hesse, Professor of Earth and Planetary Sciences

**Master of Science** | *Computational Science, Engineering & Mathematics* Aug 2019 – Aug 2021  
The University of Texas at Austin, United States GPA: 3.90/4.0

*Advisor:* Dr. Marc Hesse, Professor of Earth and Planetary Sciences

**Master of Philosophy** | *Mechanical Engineering* Sept 2016 – Sept 2018  
The Hong Kong University of Science and Technology, Hong Kong GPA: 4.0(A)/4.3(A+)

*Thesis:* Fifth-order Finite Volume WENO in General Orthogonally-curvilinear Coordinates 📄

*Advisor:* Dr. Kun Xu, Chair Professor of Math and Mechanical and Aerospace Engineering

## PEER REVIEWED PUBLICATIONS

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- [6] **Shadab, M.A.**, Hiatt, E. and Hesse, M.A., 2023. PKgui: A GUI software for Polubarinova-Kochina's solutions of steady unconfined groundwater flow, *SoftwareX*, Elsevier, 101573, DOI: 10.1016/j.softx.2023.101573 📄
- [5] Hiatt, E. **Shadab, M.A.**, Hesse, M., Goudge, T., Gulick, S., 2024. Limited Recharge of a Deep Groundwater Aquifer In the Southern Highlands On Early Mars, *Icarus*, Elsevier, 115774, DOI: 10.1016/j.icarus.2023.115774
- [4] **Shadab, M.A.**, Luo, D., Hiatt, E., Hiatt, E. and Hesse, M.A., 2023. Investigating Steady Unconfined Groundwater Flow using Physics Informed Neural Networks, *Advances in Water Resources*, Elsevier, 104445, ISSN 0309-1708, DOI: 10.1016/j.advwatres.2023.104445
- [3] **Shadab, M.A.** and Hesse, M.A., 2022. Analysis of gravity-driven infiltration with the development of a saturated region, *Water Resources Research (AGU)*, DOI: 10.1029/2022WR032963
- [2] **Shadab, M.A.**, Balsara, D., Shyy, W. and Xu, K., 2019. Fifth order finite volume WENO in general orthogonally - curvilinear coordinates. *Computers & Fluids (Elsevier)*, 190, pp.398-424.
- [1] **Shadab, M.A.**, Ji, X. and Xu, K., 2018. Fifth-order finite-volume WENO on cylindrical grids. *Spectral and High Order Methods for Partial Differential Equations (Springer)*, p.637.

## UNDER REVIEW PUBLICATIONS (PREPRINT AVAILABLE ON REQUEST)


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- [3] **Shadab, M.A.**, Adhikari, S., Rutishauser, A., Grima, C. and Hesse, M.A., 202X. Melt supply variability controls the formation of ice layers in Greenland firn. (under review in *Nature Communications*).
- [2] **Shadab, M.A.** and Hesse, M.A., 202X. A hyperbolic-elliptic PDE model and conservative numerical method for gravity-dominated variably-saturated groundwater flow. arXiv preprint arXiv:2210.04724. (under second revision in *Journal of Computational Physics*, Elsevier)
- [1] Barnes, R., ... **Shadab, M.A.**, ..., 202X. The History and Habitability of the LP 890-9 Planetary System. *Planetary Science Journal*, American Astronomical Society. (under revision)

## IN PREPARATION

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- [5] **Shadab, M.A.**, Rutishauser, A., Grima, C. and Hesse, M.A., 202X. A unified kinematic wave theory for melt infiltration into firn (for *Journal of Glaciology*, preprint available on request).
- [4] **Shadab, M.A.**, Hiatt, E. and Hesse, M.A., 202X. Analytical solutions of a low-aspect-ratio unconfined aquifer on a spherical shell: Application to early Mars (for *Journal of Geophysical Research: Planets*)

- [3] **Shadab, M.A.** and Hesse, M.A., 202X. An open source discrete operator toolbox (DOT) to solve geophysical flow problems. (for Geoscientific Model Development)
- [2] **Shadab, M.A.**, Carnahan, E., Hesse, M.A., Silber, E.A., Crosta, A.P., Vance, S.D., 202X. On modeling the impact generated melt migration (for Geophysical Research Letters)
- [1] Hesse, M.A. and **Shadab, M.A.**, 202X. Numerical Modeling for Geoscientists (book draft )

## CONFERENCES PRESENTATIONS








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- [30] **Shadab, M.A.**, Adhikari, S. Rutishauser, A., Grima, C., and Hesse, M.A., 2023. Mechanism and factors controlling ice layer formation in glacial firn. 2023 AGU Fall Meeting (accepted).
- [29] **Shadab, M.A.**, Rutishauser, A., Grima, C., and Hesse, M.A., 2023. A unified kinematic wave theory for melt infiltration into firn. 2023 AGU Fall Meeting (accepted).
- [28] Ashokkumar, L., Labe, Z., **Shadab, M.A.**, Lauter, O., Schreiber, E., Weinberg, E., 2023. Advancing Inclusion, Diversity, Equity, and Accessibility (IDEA) in the Polar Sciences by USAPECS. 2023 AGU Fall Meeting (accepted).
- [27] **Shadab, M.A.**, Hiatt, E., Bahia, R.S., Bohacek, E.V., Steinmann, V. and Hesse, M.A., 2023. Infiltration on early Mars and its implications toward aeolian-fluvial interactions. Fluvial-Aeolian Interactions on Planetary Surfaces (FAIRPLAY) workshop, European Space Agency.
- [26] **Shadab, M.A.**, Hiatt, E. and Hesse, M.A., 2023. A Deep Crustal Aquifer Model for Southern Highlands of Noachian Mars Shows Groundwater Age and Near-Surface Dynamics. NASA Exploration Science Forum 2023.
- [25] Hiatt, E., **Shadab, M.A.**, et al, 2023. Limited Recharge of the Southern Highlands Aquifer on Early Mars. Texas Area Planetary Science Meeting (TAPS) TAPS2023-55, 2023.
- [24] Vance, S.D. Carnahan, E., **Shadab, M.A.**, Hesse, M.A., Silber, E.A., Crosta, A.P., 2023. Impact foundering and material transport through ice shells of various compositions. Impact Processes as a Path to Habitability of Planetary Habitability Workshop, Brazil.
- [23] **Shadab, M.A.**, Hiatt, E. and Hesse, M.A., 2023. A Deep Crustal Aquifer Model for Southern Highlands of Noachian Mars Shows Groundwater Age and Near-Surface Dynamics. Brines Across the Solar System: Ancient and Future Brines Conference 2023, Abstract #2025.
- [22] Barnes, R., ... **Shadab, M.A.**,..., 2023. The History and Habitability of the LP 890-9 Planetary System. Biennial European Astrobiology Conference (BEACON) 2023.
- [21] **Shadab, M.A.**, Hiatt, E. and Hesse, M.A., 2023. Investigating groundwater dynamics and residence times on early Mars using unconfined aquifer model with vertical heterogeneity. 54th Lunar and Planetary Science Conference 2023, Abstract #1736.
- [20] Hesse, M.A., **Shadab, M.A.** and Hiatt, E., 2023. Time scales for Terminal Groundwater Drainage from the Southern Highlands on Mars. 54th Lunar and Planetary Science Conference 2023, Abstract #1637.
- [19] Hiatt, E., **Shadab, M.A.** and Hesse, M.A., 2023. Planetary Scale Groundwater and Surface Water Interaction on Early Mars. 54th Lunar and Planetary Science Conference 2023, Abstract #2415.
- [18] Barnes, R., ... **Shadab, M.A.**,..., 2023. History and Habitability of the LP 890-9 Planetary System. 241st American Astronomical Society Meeting 2023.
- [17] **Shadab, M.A.**, and Hesse, M.A., 2022. An extended kinematic-wave theory for infiltration in soils with declining porosity causing delayed perching. 2022 American Geophysical Union (AGU) Fall Meeting.
- [16] **Shadab, M.A.**, and Hesse, M.A., 2022. Extending Richards equation to simulate variably saturated flows. 2022 AGU Fall Meeting.
- [15] Hiatt, E. **Shadab, M.A.**, Hesse, M., Goudge, T., Gulick, S., 2022. Limited Recharge On Early Martian Aquifers: Numeric Analytic Recharge Rate Estimates As Constrained By Geomorphic and Geochemical Observations. 2022 AGU Fall Meeting.

- [14] **Shadab, M.A.**, Hiatt, E., and Hesse, M.A., 2022. Estimates of Martian mean recharge rates from analytic groundwater models. 53rd Lunar and Planetary Science Conference 2022, Abstract #1775.
- [13] Hiatt, E., **Shadab, M.A.**, et al, 2022. Estimates of groundwater divides and basins on Noachian Mars. 53rd Lunar and Planetary Science Conference 2022, Abstract #2618.
- [12] **Shadab, M.A.**, Grima, C., Rutishauser, A., and Hesse, M.A., 2021. Analytical Solutions for Melt Percolation in Ice Masses and a Pathway to Ice Lens Formation. 2021 AGU Fall Meeting.
- [11] **Shadab, M.A.**, and Hesse, M.A., 2021. Fluid Infiltration in Unsaturated Porous Medium with The Development of a Saturated Region. 2021 AGU Fall Meeting.
- [10] Hesse, M.A., **Shadab, M.A.**, Luo, D., Shen, Y., and Hiatt, E., 2021. Investigating Groundwater Flow Dynamics using Physics Informed Neural Networks (PINNs). 2021 AGU Fall Meeting.
- [9] Hiatt, E., **Shadab, M.A.**, et al, 2021. Experimental and Numerical Investigation of Seepage Face Dynamics. 2021 AGU Fall Meeting.
- [8] Hesse, M.A., **Shadab, M.A.**, Hiatt, E., Liebeck, J., 2021. Groundwater-ocean interaction on Mars. 2021 AGU Fall Meeting.
- [7] Hiatt, E., **Shadab, M.A.**, et al, 2021. Numerical Modeling of the Formation of Hellas Planitia with Focus on Spatio-Temporal Scales Required for Hydrologic Equilibration. 2021 AGU Fall Meeting.
- [6] **Shadab, M.A.**, Luo, D., Shen, Y., Hiatt, E., and Hesse, M.A., 2021. Investigating fluid drainage from the edge of a porous reservoir using Physics Informed Neural Networks. 2021 SIAM Annual Meeting.
- [5] **Shadab, M.A.**, Divoux, T. and Bischofberger, I., 2020. Suppression of drop breakup in a viscoelastic bath. Bulletin of the American Physical Society.
- [4] Hiatt, E., **Shadab, M.A.** et al., 2020. Groundwater filling times for large impact basins on early Mars and implications for the onset of post impact hydrothermal systems. American Geophysical Society 2020 Fall Meeting.
- [3] **Shadab, M.A.**, Ji, X. and Xu, K., 2018. Fifth-order finite-volume WENO on Cylindrical Grids: Flux Evaluation Using Riemann Solvers and Gas-kinetic Scheme. In International Conference on Spectral And High Order Methods (ICOSAHOM), Imperial College London.
- [2] **Shadab, M.A.**, and Xu, K., 2017. Fifth order finite volume WENO in orthogonally-curvilinear coordinates. In 5th International Conference on Numerical Simulations for Multimaterial and Multiphysics Problems.
- [1] **Shadab, M.A.** and Baig, M.F., 2017. Investigation and Control of Unstart Phenomenon in Scramjets. In 21st AIAA International Space Planes and Hypersonics Technologies Conference (p. 2298).

## HONORS AND AWARDS

<b>AGU Cryosphere Innovation Award / Flash Freeze Competition Winner</b> 	Dec 2023
Awarded based on a two-minute pitch of innovative idea to a panel of five judges at AGU 2023.	\$1,000
<b>UT Austin Graduate School Summer Fellowship</b> 	June - Aug 2024
Awarded based on academic standing and research experience supported by recommendations.	\$11,527
<b>UT Austin Graduate School Spring Dissertation Writing Fellowship</b> 	Jan - May 2024
Granted for academic and research excellence, substantiated by recommendations.	\$22,127
<b>NASA Jet Propulsion Laboratory Graduate Fellowship</b> 	June - Aug 2023
To investigate life-supporting conditions on Europa with Dr. Steve Vance at JPL.	\$12,100
<b>UT Austin Professional Development Award</b> 	October 2022
For presenting two researches conducted at the UT Austin.	\$500
<b>NASA Jet Propulsion Laboratory Graduate Fellowship</b> 	April - June 2022
To study effect of climate change on Greenland ice sheet with Dr. Surendra Adhikari at JPL.	\$9,000

<b>Purdue Climate Scholar by Purdue University and Office of Naval Research</b> 	June - Aug 2022
To attend Summer Institute for Sustainability & Climate Change at Purdue University.	
<b>MIT - Houston Energy Innovation Student Fellow</b> 	Mar 2022 - May 2023
Representing UT Austin as a liaison between MIT's Martin Trust Center and Greentown Labs.	
<b>Lunar and Planetary Institute Career Development Award</b> 	Feb 2022
For first author abstract and application materials submitted at LPSC 2022.	
<b>UT Austin Cactus Standout Award (estd. 1894)</b> 	April 2022
For academic excellence and leadership contributions. Inducted into Annual Yearbook, 2022.	
<b>Student Research Award in Planetary Habitability by Cent. for Planetary Sys. Habitability</b> 	Jan 2022
For proposal on finding life-supporting conditions on Europa using computational methods.	
<b>Outstanding Student Presenters Award by Unsaturated Zone Technical Committee, AGU</b> 	Dec 2021
Third prize for oral presentation: H52D-10 Rainwater Infiltration at AGU Fall Meeting 2021. 	
<b>SIAM Certificate of Recognition by Society for Industrial and Applied Mathematics</b>	Feb 2021
For outstanding service and contributions to the UT Austin Student Chapter of SIAM.	
<b>Blue Sky Student Fellowship by University of Texas Institute for Geophysics</b>	August 2021 - July 2022
Year-long fellowship covering tuition, insurance & stipend awarded for research proposal.	
<b>Best Teaching Assistant Award by Dept of Mech &amp; Aero Engg, HKUST</b>	August 2018
Awarded for MECH-1907 Introduction to Aerospace Engineering course based on student surveys and jury of professors.	
<b>Judge's Award and Audience Award at MIT MEMSI Program</b>	June 2018
Awarded by MIT and Hong Kong Innovation Node to best startup idea & pitch in the program.	
<b>Outstanding Contribution in Reviewing Recognition by Journal of Computational Physics</b>	June 2018
For being in the top 10th percentile of reviewers.	
<b>Postgraduate Studentship by HKUST</b>	Aug 2016 – Sept 2018
Competitive stipend for research postgraduate students (M.Phil.) at HKUST.	

## RESEARCH EXPERIENCE

<b>Improving the Numerical Toolset for Geodynamics of Icy Oceans World</b>	NASA Jet Propulsion Lab
NASA Jet Propulsion Lab Graduate Fellow (Stipend: \$1,100/week)	June 2023 – August 2023
<i>Advisor:</i> Dr. Steven Vance	
<ul style="list-style-type: none"> <li>Developed a code for single phase flow in viscously compacting matrix.</li> <li>Implementing tracers into melt migration code across ice shells of icy ocean worlds.</li> <li>Developed a theoretical model, validated with simulations, for calculating time scales of melt foundering.</li> </ul>	
<b>Modeling Meltwater Percolation in Greenland's Firn</b>	NASA Jet Propulsion Lab, Caltech
NASA Jet Propulsion Lab Graduate Fellow (Stipend: \$900/week)	May 2022 – July 2022
<i>Advisor:</i> Dr. Surendra Adhikari	
<ul style="list-style-type: none"> <li>Developed a two-dimensional, three-phase (snow/water/air), firn infiltration simulator.</li> <li>Derived and validated vertically integrated model for meltwater gravity currents.</li> <li>Formulated kinematic wave theory of firn infiltration, inverted for model parameters and investigated meltwater infiltration in Greenland.</li> </ul>	
<b>Modeling Subsurface Flow of Water in Earth and Planetary Sciences</b>	The University of Texas at Austin
Graduate Research Assistant, <i>Doctoral Thesis</i> (Stipend: \$2,609/month)	August 2019 – Present
<i>Advisor:</i> Prof. Marc Hesse	
<ul style="list-style-type: none"> <li>Developed and validated a conservative finite-difference based solver in Python for simulating a 2D two-phase flow in non-deforming porous media.</li> <li>Implemented the solver to study the behavior of Post Impact Hydrothermal systems on Mars.</li> <li>Implementing the solver to investigate the melt percolation on ice masses to study effects of global warming.</li> </ul>	

## Investigating Groundwater Flows using Physics Informed Neural Networks

UT Austin

Independent Research

August 2020 – June 2023

Collaborators: DingCheng Luo, Yiran Shen, Eric Hiatt, and Prof. Marc Hesse

- Wrote python codes for data-driven discovery of steady-state PDE from experimental data.
- Investigated the effect of PDE regularization in PINNs and the role of PDE & data misfit.
- Learned the PDE parameters and boundary conditions for the transient seepage across edge of a porous reservoir simulated using finite-differencing.

## Free Fall of a Viscous Drop in a Viscoelastic Medium

Massachusetts Institute of Technology

Visiting Graduate Student Researcher (Stipend: \$2,150/month)

October 2018 – April 2019

Advisor: Prof. Irmgard Bischofberger

- Performed a literature review of computational and experimental methods for investigating drop dynamics.
- Designed the experiments and apparatus with high-speed imaging.
- Wrote MATLAB scripts for analyzing moving camera videos using template matching.

## High-Order Finite-Volume Reconstruction in Curvilinear Coordinates

HKUST, Hong Kong

Graduate Research Assistant, *M.Phil. Thesis* (Stipend: \$2,150/month)

December 2016 – September 2018

Advisor: Prof. Kun Xu

- Proposed a general theory for state-of-art fifth order finite volume WENO in curvilinear coordinates.
- Derived analytical relations and developed Fortran codes along with Riemann solvers and gas-kinetic scheme.

## Modal Decomposition Techniques on a Thermoacoustic System

HKUST & U of Cambridge

Collaborative Research (Stipend: \$2,150/month)

September 2016 – December 2016

Advisor: Prof. Larry Li

- Analyzed and compared the prominent modal decomposition techniques for developing low order models.
- Investigated nonlinear interactions between flame & external forcing for different amplitudes & frequencies.

## TEACHING EXPERIENCE

### GEO 325C/398C Continuum Mechanics (Level: Graduate)

Fall 2023

University of Texas at Austin

Austin

Position: Teaching Assistant, Instructor: Prof. Marc Hesse

### GEO 325M/398M Numerical Modeling in the Geosciences (Level: Graduate)

Spring 2023

University of Texas at Austin

Austin

Position: Teaching Assistant, Instructor: Prof. Marc Hesse

### GEO 325C/398C Continuum Mechanics (Level: Graduate)

Fall 2022

University of Texas at Austin

Austin

Position: Teaching Assistant, Instructor: Prof. Marc Hesse

### MECH-1907 Introduction to Aerospace Engineering (Level: Freshman, Sophomore)

Spring 2018

The Hong Kong University of Science and Technology

Hong Kong

Position: Teaching Assistant, Instructor: Prof. Rhea Liem

### MECH-3690 Aerospace Engineering Laboratory (Level: Senior, Junior)

Spring 2017

The Hong Kong University of Science and Technology


Hong Kong

Position: Teaching Assistant, Instructor: Prof. Jinglei Yang

For all teaching feedback reports and certificates, click .

## PEDAGOGICAL TRAINING

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<b>Inclusive Course Design Institute 2023</b> 	Summer 2023
The University of Texas at Austin	Austin
Using Universal Design for Learning (UDL) and best-practices, designed a course from ground up.	
<b>Inclusive Classrooms Leadership Certificate Seminar Series</b>	Spring 2023
The University of Texas at Austin	Austin
Learned strategies for developing and sustaining an inclusive classroom along with course design.	
<b>Advanced Teaching Preparation Series Certificate</b>	Spring – Fall 2022
The University of Texas at Austin	Austin
Advance teaching certificate for learning and practicing techniques of good classroom teaching.	
<b>Graduate Teaching Assistant Training Program</b>	Fall 2017 – Spring 2018
The Hong Kong University of Science and Technology	Hong Kong
Learned the fundamentals of teaching assistantship and effective pedagogy.	

## TRAVEL GRANTS AND FUNDED SHORT SCHOOLS

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<b>Early Career Travel Award by European Space Agency</b>	September 2023
Received a travel award by ESA to attend the FAIRPLAY 2023 Workshop in the Netherlands.	€2048
<b>Center for Planetary Systems' Habitability Student Travel Funding Award</b>	February 2023
Received a travel grant to attend the LPSC 2023.	\$1000
<b>Early Career Tiny Grants - AGU Ecohydrology Committee</b>	December 2022
For early-career scientists presenting ecohydrology-related work at the AGU Fall Meeting 2022.	\$214
<b>Center for Planetary Systems' Habitability Student Travel Funding Award</b>	February 2022
Awarded a travel grant to attend the LPSC 2022.	\$1000
<b>AGU Fall Meeting Grant</b>	December 2021
Awarded a travel grant by UT Austin to attend the AGU Fall Meeting 2021.	
<b>SIAM Student Travel Award</b>	June 2021
Awarded a student travel grant to attend the SIAM Annual Meeting 2021.	\$650
<b>ICOSAHOM Conference Travel Grant</b>	July 2018
Awarded a student travel grant to attend the International Conference on Spectral And High Order Methods at Imperial College London.	\$2500
<b>Numerical Simulations ICNM 2017 Conference Travel Grant</b>	July 2017
Awarded full funding from HKUST for attending the 5th International Conference on Numerical Simulations for Multimaterial and Multiphysics Problems in China.	\$2200
<b>Advanced Research in Turbomachinery Summer School Grant</b>	July 2019
Received a scholarship to attend this summer school organized by the University of Florence, Italy and sponsored by ANSYS and GE.	€800
<b>MIT StartMIT Course Grant</b>	January 2019
Received full sponsorship from MIT Martin Trust Center to attend this hands-on MIT course on entrepreneurship involving multiple trips to companies within USA.	
<b>Fluid Dynamics across Scales Summer School Grant</b>	July 2018
Received full-funding from HKUST to attend the Centre for Doctoral Training in Fluid Dynamics across Scales at Imperial College London.	\$1000
<b>MIT Entrepreneurship and Maker Skills Integrator Bootcamp Funding</b>	June 2018
Received full funding from MIT and Hong Kong Innovation Node to attend the program involving trips to startup incubators in China.	

## COMMUNITY INVOLVEMENT

<b>Executive Secretary and Reviewer, Three NASA Proposal Review Panels</b> 	Jan 2023 – Present \$1875+1490+1900
Managing the panel review, assisting the group chief and reviewing the proposals in 3 panels.	
<b>Young Professional Mentor, Zed Factor Fellowship Program</b> 	May 2023 - Present
Mentor rising undergraduate students in Aerospace Engineering.	
<b>Team Member, UT Austin Libraries HELIOS team</b> 	April 2023 - Present
To advance Higher Education Leadership Initiative for Open Scholarship (HELIOS). Gave a speech at <b>US White House</b> on Open Science (News  , Post  , Video  ). Organizer and Panelist at the First Texas Open Science Summit  . Panelist at the Open Science Webinar at Navigating the New Arctic Office  . Panelist at Open Science Event by Intl. Federation of Library Assoc. & Institutions  .	
<b>Co-Chair &amp; DEI Team Lead, US Assoc. of Polar Early Career Scientists</b> 	Sept 2022 – Present
Fostering climate and DEI-conscious collaborations between academia & polar organizations.	
<b>Board Member, AGU Hydrology Section Student Subcommittee (AGU-H3S)</b> 	Jan 2023 – Present
Providing professional development & networking opportunities to early career hydrologists.	
<b>Volunteer, MIT Energy Conference</b> 	April 2023 \$900
Helped with organizing the conference in person in Boston.	
<b>Coordinator, Center for Planetary Systems Habitability Student Travel Award</b> 	Jan – Apr 2023
Organizing, coordinating and liaising the application process for student travel to LPSC 2023.	
<b>MIT - Houston Energy Innovation Student Fellow</b> 	March 2022 – April 2023
Creating energy innovation ecosystem considering the threat of climate change.	
<b>Volunteer / Braindate Lounge Assistant, AGU Fall Meeting 2022</b> 	Dec 2022
Facilitated collaborations between researchers and scientists through Braindate at AGU 2022.	
<b>Mentor, American Geophys. Union Earth &amp; Planetary Surface Processes (EPSP)</b> 	Oct 2022 – Present Virtual
Mentoring graduate students across the world for developing technical and research skills in EPSP.	
<b>Geoscience Ambassador, Jackson School of Geosciences, UT Austin</b> 	Sept 2021 - Present Austin, USA
Making geoscience accessible to broader community & promoting interdisciplinary research.	
<b>Session Chair, Society for Industrial &amp; Applied Mathematics Annual Meeting 2021</b> 	July 2021 Virtual
Chaired the “CP15: Machine Learning and Data Mining” Session.	
<b>President &amp; Senior Advisor, Soc. for Industrial &amp; Applied Math, Austin Chapter</b> 	Sept 2020 – Present Austin, USA
Spearheaded several programs & Won Best Graduate Organization at UT Austin Award.	
<b>Mentor, Mentoring365, American Geophysical Union</b> 	Aug 2021 – Present Virtual
Facilitating an exchange of professional knowledge, skills, and experiences in Earth and space sciences.	
<b>Mentor, SIAM Applied Mathematics Mentorship</b> 	Jan 2021 – Present Austin, USA
Conceptualized the program and mentoring UT students for applied math concepts and prospects.	
<b>Volunteer, Lunar and Planetary Science Conference 2022</b> 	March 2021 Houston, USA
Managed a virtual and an in-person session and moreover conference logistical tasks.	
<b>Mentor, Sir Syed Global Scholar Award</b> 	Jan 2016 – Present Aligarh, India
Mentoring top AMU students from humble backgrounds for US grad school applications.	
<b>Zonal Head &amp; College Head Ambassador, Smilyo Educational Charitable Society</b> 	Jan 2014 – Jan 2015 New Delhi, India
Managed multi-university teams & provided educational resources to not-so-privileged.	
<b>Senior Under Officer, National Cadet Corps, Govt. of India (Similar to ROTC)</b> 	Jan 2013 – April 2015 Aligarh, India
C certificate holder, best cadet, organized blood donation, awareness, & army camps	

## REVIEWER FOR TECHNICAL JOURNALS

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**Geoscience:** Computational Geoscience (Springer Nature), Water Resources Research, Geophysical Research Letters, Journal of Geophysical Research - Planets

**Numerical Methods:** Journal of Computational Physics, Geoscientific Model Development, Computer and Fluids

## SKILLS

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**Languages:** C, C++, Fortran 77/90, Python (SciPy, NumPy, Matplotlib, Pandas, Tensorflow, GUI programming, Webscraping), HTML, MATLAB, Mathematica, Shell Scripting, L<sup>A</sup>T<sub>E</sub>X, High Performance Computing (SLURM)

**Software:** AutoCAD, SolidWorks, ANSYS, Fluent, COMSOL Multiphysics, TecPlot, ParaView, CHEMKIN, COSILAB, Microsoft Office, Git, Travis CI, Docker, Hydrus, VPLANet, ArcGIS, ENVI, PlanetProfile

**OS:** Linux, Windows, Mac

## STUDENT MEMBERSHIP

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American Geophysical Union


Association of Polar Early Career Scientists







Society for Industrial and Applied Mathematics

American Physical Society

## MEDIA COVERAGE

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**Fulfilling my NASA dream - Sir Syed Global Scholar Award Story of the Month**  Aug 2022  
On my post-baccalaureate experience towards landing a graduate fellowship at NASA JPL.

**Mars may have less water than previously estimated - Multiple news outlets** April 2022  
UT Austin Website (front cover) ,  & , Phys.org , Times of India , Bailey Universe 

**Outstanding Student Presentation Award at AGU 2021 - UT Austin**  April 2022  
For outstanding student presentation on Rainwater Infiltration in AGU Fall Meeting 2021.

**CPSH Travel Grant Sends 11 Students to LPSC - UT Austin**  March 2022  
For travel grant of \$1,000 from Center for Planetary Systems Habitability to attend LPSC 2022.

**Lunar & Planetary Institute Career Devel. Award News - UT Austin** , **LPI News**  Feb 2022  
For outstanding first-authored work on fate of water on early Mars submitted at LPSC conference.

**How To Stay Productive While in Quarantine - Oden Institute Feature Article**  March 2021  
For academic & research achievements and service at Oden Institute during quarantine.

## OPEN SOURCE SOFTWARES

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[4] **Shadab, M.A.**, Hiatt, E., and Hesse, M.A., 2022. mashadab/polubarinova-kochina-solutions: P-k tool v1.1 (v1.1). Zenodo. <https://doi.org/10.5281/zenodo.74786522>

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