Mohammad Afzal Shadab

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Education

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

[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)

[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

[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

[31] Barnes, R., ... **Shadab, M.A.**,..., 2023. The History and Habitability of the LP 890-9 Planetary System. 2024 Astrobiology Science Conference, ID# 1498545.

[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.

[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.

[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.

[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

UT Austin Professional Development Award January 2024
For presenting two research works conducted at UT Austin. $500

NASA Open Science Badge Jan 2024
Completed 5 open science modules offered by NASA TOPS Program.

AGU Cryosphere Innovation Award / Flash Freeze Competition Winner Dec 2023
Awarded based on a two-minute pitch of innovative idea to a panel of five judges at AGU 2023. $1,500

UT Austin Graduate School Summer Fellowship June - Aug 2024
Awarded based on academic standing and research experience supported by recommendations. $11,527

UT Austin Graduate School Spring Dissertation Writing Fellowship Jan - May 2024
Granted for academic and research excellence, substantiated by recommendations. $22,127

NASA Jet Propulsion Laboratory Graduate Fellowship June - Aug 2023
To investigate life-supporting conditions on Europa with Dr. Steve Vance at JPL. $12,100

UT Austin Professional Development Award October 2022
For presenting two research works conducted at UT Austin. $500

NASA Jet Propulsion Laboratory Graduate Fellowship April - June 2022
To study effect of climate change on Greenland ice sheet with Dr. Surendra Adhikari at JPL. $9,000

Purdue Climate Scholar by Purdue University and Office of Naval Research June - Aug 2022
To attend Summer Institute for Sustainability & Climate Change at Purdue University. $4,000

MIT - Houston Energy Innovation Student Fellow Mar 2022 - May 2023
Representing UT Austin as a liaison between MIT's Martin Trust Center and Greentown Labs.

Lunar and Planetary Institute Career Development Award Feb 2022
For first author abstract and application materials submitted at LPSC 2022. $1,000

UT Austin Cactus Standout Award (estd. 1894) April 2022
For academic excellence and leadership contributions. Inducted into Annual Yearbook, 2022.

Student Research Award in Planetary Habitability by Cent. for Planetary Sys. Habitability Jan 2022
For proposal on finding life-supporting conditions on Europa using computational methods. $16,425

Outstanding Student Presenters Award by Unsaturated Zone Technical Committee, AGU Dec 2021
Third prize for oral presentation: H52D-10 Rainwater Infiltration at AGU Fall Meeting 2021. $175

SIAM Certificate of Recognition by Society for Industrial and Applied Mathematics Feb 2021
For outstanding service and contributions to the UT Austin Student Chapter of SIAM.

Blue Sky Student Fellowship by University of Texas Institute for Geophysics August 2021 - July 2022
Year-long fellowship covering tuition, insurance & stipend awarded for research proposal. $2,491/month

Best Teaching Assistant Award by Dept of Mech & Aero Engg, HKUST August 2018
Awarded for MECH-1907 Introduction to Aerospace Engineering course based on
student surveys and jury of professors. HK$300

Judge's Award and Audience Award at MIT MEMSI Program June 2018
Awarded by MIT and Hong Kong Innovation Node to best startup idea & pitch in the program.

Outstanding Contribution in Reviewing Recognition by Journal of Computational Physics June 2018
For being in the top 10th percentile of reviewers.

Postgraduate Studentship by HKUST Aug 2016 – Sept 2018
Competitive stipend for research postgraduate students (M.Phil.) at HKUST. $2,150/month

Research Experience

Improving the Numerical Toolset for Geodynamics of Icy Oceans World NASA Jet Propulsion Lab
NASA Jet Propulsion Lab Graduate Fellow (Stipend: $1,100/week) June 2023 – August 2023
Advisor: Dr. Steven Vance

- Developed a code for single phase flow in viscously compacting matrix.
- Implementing tracers into melt migration code across ice shells of icy ocean worlds.
- Developed a theoretical model, validated with simulations, for calculating time scales of melt foundering.

Modeling Meltwater Percolation in Greenland's Firn NASA Jet Propulsion Lab, Caltech
NASA Jet Propulsion Lab Graduate Fellow (Stipend: $900/week) May 2022 – July 2022
Advisor: Dr. Surendra Adhikari

- Developed a two-dimensional, three-phase (snow/water/air), firn infiltration simulator.
- Derived and validated vertically integrated model for meltwater gravity currents.
- Formulated kinematic wave theory of firn infiltration, inverted for model parameters and investigated meltwater infiltration in Greenland.

Modeling Subsurface Flow of Water in Earth and Planetary Sciences The University of Texas at Austin
Graduate Research Assistant, *Doctoral Thesis* (Stipend: $2,609/month) August 2019 – Present
Advisor: Prof. Marc Hesse

- Developed and validated a conservative finite-difference based solver in Python for simulating a 2D two-phase flow in non-deforming porous media.
- Implemented the solver to study the behavior of Post Impact Hydrothermal systems on Mars.
- Implementing the solver to investigate the melt percolation on ice masses to study effects of global warming.

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

Inclusive Course Design Institute 2023 Summer 2023
The University of Texas at Austin Austin
Using Universal Design for Learning (UDL) and best-practices, designed a course from ground up.

Inclusive Classrooms Leadership Certificate Seminar Series Spring 2023
The University of Texas at Austin Austin
Learned strategies for developing and sustaining an inclusive classroom along with course design.

Advanced Teaching Preparation Series Certificate Spring – Fall 2022
The University of Texas at Austin Austin
Advance teaching certificate for learning and practicing techniques of good classroom teaching.

Graduate Teaching Assistant Training Program 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

Center for Planetary Systems' Habitability Student Travel Award February 2024
Awarded a travel grant to attend the LPSC 2024. $1000

Early Career Travel Award by European Space Agency September 2023
Recieved a travel award by ESA to attend the FAIRPLAY 2023 Workshop in the Netherlands. €2048

Center for Planetary Systems' Habitability Student Travel Award February 2023
Received a travel grant to attend the LPSC 2023. $1000

Early Career Tiny Grants - AGU Ecohydrology Committee December 2022
For early-career scientists presenting ecohydrology-related work at the AGU Fall Meeting 2022. $214

Center for Planetary Systems' Habitability Student Travel Award February 2022
Awarded a travel grant to attend the LPSC 2022. $1000

AGU Fall Meeting Grant December 2021
Awarded a travel grant by UT Austin to attend the AGU Fall Meeting 2021.

SIAM Student Travel Award June 2021
Awarded a student travel grant to attend the SIAM Annual Meeting 2021. $650

ICOSAHOM Conference Travel Grant July 2018
Awarded a student travel grant to attend the International Conference on Spectral And High Order Methods at Imperial College London. $2500

Numerical Simulations ICNM 2017 Conference Travel Grant July 2017
Awarded full funding from HKUST for attending the 5th International Conference on Numerical Simulations for Multimaterial and Multiphysics Problems in China. $2200

Advanced Research in Turbomachniery Summer School Grant July 2019
Received a scholarship to attend this summer school organized by the University of Florence, Italy and sponsored by ANSYS and GE. €800

MIT StartMIT Course Grant 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.

Fluid Dynamics across Scales Summer School Grant July 2018
Received full-funding from HKUST to attend the Centre for Doctoral Training in Fluid Dynamics across Scales at Imperial College London. $1000

MIT Entrepreneurship and Maker Skills Integrator Bootcamp Funding 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

Executive Secretary and Reviewer, Three NASA Proposal Review Panels Jan 2023 – Present
Managing the panel review, assisting the group chief and reviewing the proposals in 3 panels. $1875+1490+1900

Young Professional Mentor, Zed Factor Fellowship Program May 2023 - Present
Mentor rising undergraduate students in Aerospace Engineering.

Team Member, UT Austin Libraries HELIOS team April 2023 - Present
To advance Higher Education Leadership Initiative for Open Scholarship (HELIOS).
Gave a speech at **US White House** 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.

Co-Chair & DEI Team Lead, US Assoc. of Polar Early Career Scientists Sept 2022 – Present
Fostering climate and DEI-conscious collaborations between academia & polar organizations.

Board Member, AGU Hydrology Section Student Subcommittee (AGU-H3S) Jan 2023 – Present
Providing professional development & networking opportunities to early career hydrologists.

Volunteer, MIT Energy Conference April 2023
Helped with organizing the conference in person in Boston. $900

Coordinator, Center for Planetary Systems Habitability Student Travel Award Jan – Apr 2023
Organizing, coordinating and liaising the application process for student travel to LPSC 2023.

MIT - Houston Energy Innovation Student Fellow March 2022 – April 2023
Creating energy innovation ecosystem considering the threat of climate change.

Volunteer / Braindate Lounge Assistant, AGU Fall Meeting 2022 Dec 2022
Facilitated collaborations between researchers and scientists through Braindate at AGU 2022.

Mentor, American Geophys. Union Earth & Planetary Surface Processes (EPSP) Oct 2022 – Present
Mentoring graduate students across the world for developing technical and research skills in EPSP. Virtual

Geoscience Ambassador, Jackson School of Geosciences, UT Austin Sept 2021 - Present
Making geoscience accessible to broader community & promoting interdisciplinary research. Austin, USA

Session Chair, Society for Industrial & Applied Mathematics Annual Meeting 2021 July 2021
Chaired the "CP15: Machine Learning and Data Mining" Session. Virtual

President & Senior Advisor, Soc. for Industrial & Applied Math, Austin Chapter Sept 2020 – Present
Spearheaded several programs & Won Best Graduate Organization at UT Austin Award. Austin, USA

Mentor, Mentoring365, American Geophysical Union Aug 2021 – Present
Facilitating an exchange of professional knowledge, skills, and experiences in Earth and space sciences. Virtual

Mentor, SIAM Applied Mathematics Mentorship Jan 2021 – Present
Conceptualized the program and mentoring UT students for applied math concepts and prospects. Austin, USA

Volunteer, Lunar and Planetary Science Conference 2022 March 2021
Managed a virtual and an in-person session and moreover conference logistical tasks. Houston, USA

Mentor, Sir Syed Global Scholar Award Jan 2016 – Present
Mentoring top AMU students from humble backgrounds for US grad school applications. Aligarh, India

Zonal Head & College Head Ambassador, Smilyo Educational Charitable Society Jan 2014 – Jan 2015
Managed multi-university teams & provided educational resources to not-so-privileged. New Delhi, India

Senior Under Officer, National Cadet Corps, Govt. of India (Similar to ROTC) Jan 2013 – April 2015
C certificate holder, best cadet, organized blood donation, awareness, & army camps Aligarh, India

Reviewer for Technical Journals

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

Languages: C, C++, Fortran 77/90, Python (SciPy, NumPy, Matplotlib, Pandas, Tensorflow, GUI programming, Webscraping), HTML, MATLAB, Mathematica, Shell Scripting, LaTeX, 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

American Geophysical Union
Association of Polar Early Career Scientists
Society for Industrial and Applied Mathematics
American Physical Society

Media Coverage

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

[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

[3] **Shadab, M.A.**, Luo, D., Shen, Y., Hiatt, E., and Hesse, M.A., 2021. PINNs for Unconfined Groundwater Flow (v1.0). Zenodo. https://doi.org/10.5281/zenodo.5803542

[2] **Shadab, M.A.** and Hesse, M.A., 2022. Gravity driven infiltration with the development of a saturated region (v1.0). Zenodo. DOI: 10.5281/zenodo.6558260. URL: https://github.com/mashadab/hyperbolic-infiltration-theory

[1] **Shadab, M.A.**, 2021. Reservoir-Simulator. Zenodo. DOI: https://doi.org/10.5281/zenodo.6581752. URL: https://github.com/mashadab/Reservoir-Simulator