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: Prof. Marc Hesse

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: Prof. Marc Hesse

Master of Philosophy | Mechanical Engineering

Aug 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: Prof. Kun Xu

PEER REVIEWED PUBLICATIONS

[5] Hiatt, E. **Shadab**, **M.A.**, Hesse, M., Goudge, T., Gulick, S., 2023. 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

- [4] **Shadab, M.A.**, Adhikari, S., Rutishauser, A., Grima, C. and Hesse, M.A., 202X. Mechanism and factors controlling the formation of ice layers in firn. (submitted to Science).
- [3] **Shadab, M.A.**, Hiatt, E. and Hesse, M.A., 202X. Kochina (1962) solutions for steady unconfined groundwater flow: a free tool and its applicability. (under review in SoftwareX, Elsevier)
- [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

- [4] **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).
- [3] **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)

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

CONFERENCES PRESENTATIONS

- [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 (submitted).
- [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 (submitted).
- [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 (submitted).
- [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. (accepted)
- [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).

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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 Graduate School Summer Fellowship ☑ Awarded based on academic standing and research experience supported by recommendations	June - Aug 2023 s. \$11,527
UT Austin Professional Development Award ☑ For presenting two researches conducted at the UT Austin.	October 2022 \$500
NASA Jet Propulsion Laboratory Graduate Fellowship ☑ To study effect of climate change on Greenland ice sheet with Dr. Surendra Adhikari at JPL.	April - June 2022 \$9,000
Purdue Climate Scholar by Purdue University and Office of Naval Research ☑ To attend Summer Institute for Sustainability & Climate Change at Purdue University.	June - Aug 2022 \$4,000
MIT - Houston Energy Innovation Student Fellow ARepresenting UT Austin as a liaison between MIT's Martin Trust Center and Greentown Labs.	Mar 2022 - May 2023
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

June 2018

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 Jan 2021 \$2,491/month Year-long fellowship covering tuition, insurance & stipend awarded for research proposal.

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

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

Judge's Award and Audience Award at MIT MEMSI Program

NASA Jet Propulsion Lab 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)

NASA Jet Propulsion Lab Graduate Fellow (Stipend: \$1,100/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

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

October 2018 - April 2019

Massachusetts Institute of Technology

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)

August 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

Austin

University of Texas at 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.

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 Funding Award Recieved a travel grant to attend the LPSC 2023.	February 2023 \$1000
Early Career Tiny Grants - AGU Ecohydrology Committee For early-career scientists presenting ecohydrology-related work at the AGU Fall Meeting 2022	December 2022 2. \$214
Center for Planetary Systems' Habitability Student Travel Funding Award Awarded a travel grant to attend the LPSC 2022.	February 2022 \$1000
AGU Fall Meeting Grant Awarded a travel grant by UT Austin to attend the AGU Fall Meeting 2021.	December 2021
SIAM Student Travel Award Awarded a student travel grant to attend the SIAM Annual Meeting 2021.	June 2021 \$650
ICOSAHOM Conference Travel Grant Awarded a student travel grant to attend the International Conference on Spectral And High Order Methods at Imperial College London.	July 2018 \$2500
Numerical Simulations ICNM 2017 Conference Travel Grant Awarded full funding from HKUST for attending the 5th International Conference on Numerical Simulations for Multimaterial and Multiphysics Problems in China.	July 2017 \$2200
Advanced Research in Turbomachniery Summer School Grant Received a scholarship to attend this summer school organized by the University of Florence, Italy and sponsored by ANSYS and GE.	July 2019 €800
MIT StartMIT Course Grant Received full sponsorship from MIT Martin Trust Center to attend this hands-on MIT course of entrepreneurship involving multiple trips to companies within USA.	January 2019
Fluid Dynamics across Scales Summer School Grant Received full-funding from HKUST to attend the Centre for Doctoral Training in Fluid Dynamics across Scales at Imperial College London.	July 2018 \$1000
MIT Entrepreneurship and Maker Skills Integrator Bootcamp Funding Received full funding from MIT and Hong Kong Innovation Node to attend the program invo trips to startup incubators in China.	June 2018 living
COMMUNITY INVOLVEMENT Executive Secretary and Reviewer, Three NASA Proposal Review Panels Managing the panel review, assisting the group chief and reviewing the proposals in 3 panels.	Jan 2023 – Present \$1875+1490+1900
Young Professional Mentor, Zed Factor Fellowship Program ☑ Mentor rising undergraduate students in Aerospace Engineering.	May 2023 - Present
Team Member, UT Austin Libraries HELIOS team ☑ 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 ☑.	April 2023 - Present
Co-Chair & DEI Team Lead, US Assoc. of Polar Early Career Scientists ☑ Fostering climate and DEI-conscious collaborations between academia & polar organizations.	Sept 2022 – Present
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

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.

Organizing, coordinating and liaising the application process for student travel to LPSC 2023.

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.

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 2 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) 2 Jan 2013 – April 2015 C certificate holder, best cadet, organized blood donation, awareness, & army camps

Aligarh, India

REVIEWER FOR TECHNICAL JOURNALS

Geoscience: Computational Geoscience, Water Resources Research, Geophysical Research Letters 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 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 Con my post-baccalaureate experience towards landing a graduate fellowship at NASA JPL.	Aug 2022
Mars may have less water than previously estimated - Multiple news outlets UT Austin Website (front cover) 🗷, 🗹 & 🗹, Phys.org 🗹, Times of India 🖸, Bailey Universe 🖸	April 2022
Outstanding Student Presentation Award at AGU 2021 - UT Austin For outstanding student presentation on Rainwater Infiltration in AGU Fall Meeting 2021.	April 2022
CPSH Travel Grant Sends 11 Students to LPSC - UT Austin ☑ For travel grant of \$1,000 from Center for Planetary Systems Habitability to attend LPSC 2022.	March 2022
Lunar & Planetary Institute Career Devel. Award News - UT Austin , LPI News . For outstanding first-authored work on fate of water on early Mars submitted at LPSC conference.	Feb 2022
How To Stay Productive While in Quarantine - Oden Institute Feature Article For academic & research achievements and service at Oden Institute during quarantine.	March 2021

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