<div align="center">**Curriculum Vitae**</div>

Name

Shu Hua Lai （賴淑華） luckycvita.lai@gmail.com; lucky@g.ncu.edu.tw

1976/03/11

Educational Background

B.S. degree (*1994-1998*): Department of Atmospheric Science, National Central University

M.A. degree (*1998-20*00): Graduate Institute of Space Science, National Central University

Ph.D. degree (*2001-2006*): Graduate Institute of Space Science, National Central University

Experiences

2000.07 - 2001.06: Student Teacher, St. Francis Xavier High School

2001.08 - 2003.06: Earth Science Teacher, Fudan High School

2006.08 - 2013.06 : Postdoctoral Fellow, Graduate Institute of Space Science and Astronomy, NCU

2014.02 - 2015.07 : Algorithm Engineer, AcroMass Technologies, Inc., Taipei.

2016.08 - 2023.03 :Postdoctoral, Center for Advanced Model Research Development and Applications, NCU

2023.05 -   : Postdoctoral Fellow, Department of Space Science and Engineering, NCU

Specialties

1. Plasma and space physics
   - *planetary magnetosphere physics*
   - *nonlinear plasma waves*

2. Computational fluid dynamics (CFD)
   - *computational physics*
   - *numerical schemes*

3. Space plasma simulation
   - *magnetohydrodynamics (MHD) simulation (nonlinear wave formation and energy transport, interactions between solar wind and planetary magnetosphere)*
   - *hybrid simulation for space plasma (evolution of space discontinuities, plasma waves)*

4. Groundwater modeling and surface water modeling
   - *multiphase flow coupled nonlinear geomechanical modeling (deep repository of nuclear waste)*
   - *variable saturated flow coupled geochemistry modeling (groundwater contaminated site remediation)*
   - *hydraulic coupled sediment transport and water quality modeling (prediction and prevention of heavy mental polluted sediment in rivers)*

5. Numerical model development
   - ✧ Groundwater THMC full coupled model (Finite Element Method)
   - *Multiphase flow module and nonlinear geo-mechanical module of groundwater model THMC, Fortran*
   - *Mesh-generator to convert grid mesh obtained from groundwater model MODFLOW to the hexahedron cell used in HGC 5.3 (THMC 5.3), Fortran*
   - ✧ Space plasma numerical model (Finite Difference Method)
   - *MHD simulation model, Fortran*
   - *Two-fluid (electron fluid and ion fluid) model, Fortran*

Proficient programming languages

Fortran and Matlab

Projects involved in since 2016

1. 台灣電力股份有限公司核能後端營運處,「用過核子燃料最終處置計畫-安全評估分析及系統模式技術之平行驗證」,2015/11/19-2019/11/19。

2. International project: DEvelopment of COupled models and their VALidation against Experiments (DECOVALEX-2019),2015/11/19-2019/11/19

3. 行政院環境保護署土地及地下水汙染整治基金會,「污染場址地下環境分析模式整合發展與審查制度建置計畫」,2016/7-2018/1。

4. 行政院環境保護署土地及地下水汙染整治基金會,「污染場址地下環境分析模式發展計畫」,2018/7-2020/6。

5. 行政院環境保護署土地及地下水汙染整治基金會,「建置底泥品質分布預估模式及預防管理平台計畫」,2020/2-2022/2

6. 國家太空中心,「外太空探索計畫第一枚月球著陸器（OSE-LL1）酬載儀器研製」,2022-2026

International research activity since 2016

1. Referee of Alexandria Engineering Journal (SCI, Elsevier)

2. DECOVALEX-2019 meeting, oral presentations in
   Taiwan (2016), Sweden (2017),
   France (2018), Korea (2018), and Czech (2019),
   Canada (powerpoint provider, 2017).

3. DECOVALEX-2019 symposium, poster presentation in Switzerland (2019).

4. International panel review and workshop for Taiwan Power Company Project, oral presentation (2019)

Domestic research activity since 2016

1. 2018 第十屆地下水資源及水質保護研討會暨 2018 海峽兩岸地下水與水文地質用研討會(桃園),
   口頭演講: 地下深層處置場緩衝材料內部氣體遷移行為之多相流與力學耦合模擬研究
   (作者: 賴淑華、葉高次)

2. 2020 臺灣地下水資源暨水文地質學會年會及第十二屆地下水資源及水質保護研討會(基隆),海報演講:
   壓密飽和緩衝材料內部氣體遷移行為之多相流與黏彈性非線性力學耦合模擬研究
   (作者: 賴淑華、葉高次)

3. 2022 岩盤工程暨工程地質研討會(桃園),口頭演講:
   熱-水-力-化耦合模式(THMC)之非線性黏彈性地質力學模組之發展與應用
   (作者: 賴淑華、郭婉如、郭家瑋 、葉高次、陳瑞昇)

4. 熱水力化全耦合地下水數值模式及平台使用之教育訓練課程設計與講師(台電及環保署計畫)
   (核心模式 THMC 發展者:葉高次教授)

5. 河流重金屬汙染流布預估模式及平台使用之教育訓練課程設計與講師(環保署計畫)
   (核心模式 WASH123D 發展者:葉高次教授)

Journal paper

1. <u>Lai, S. H.</u>, Yang Y.-H.*, and Ip W.-H. (2024), Magnetohydrodynamic Perspective on the Disappearance of Mercury's Bow Shock by Helios Data Exploration, *The Astrophysical Journal*, 961(1), 83, doi:10.3847/1538-4357/ad0a8a.
   [SCI, IF=4.9, Rank in Space and Planetary Science : 17/106=16%, Q1]

2. <u>Lai S. H.</u>*, Chen J. S., and Yang Y.-H. (2024), Coupled Multiphase Flow and Viscoelastic Mechanics Modeling of Gas Injection in a Compacted Bentonite Buffer, *Geomechanics for Energy and the Environment*, 38, 100537, <u>doi: 10.1016/j.gete.2024.100537</u>.
   [SCI, IF=5.1, Rank in Geosciences: 29/201=14%, Q1]

3. Tamayo-Mas E., Harrington J. F., Brüning T., Kolditz O., Shao H., Dagher E., Lee J., Kim K., <u>Lai S. H.</u>, Chittenden N., Wang Y., Damians I. P. and Olivella S. (2021), Modelling advective gas flow in compact bentonite: lessons learnt from different numerical approaches, *International Journal of Rock Mechanics and Mining Sciences, volume 139*, 104580, ISSN 1365-1609, https://doi.org/10.1016/j.ijrmms.2020.104580. (SCI). [The order of authors is according to the order of reports by countries]
   [SCI, IF=7.4, Rank in Geotechnical Engineering and Engineering Geology: 2/211=1%, Q1]

4. Tsai, T. C., Yu, H.-S., Hsieh, M.-S., <u>Lai, S. H</u>. and Yang, Y.-H. (2015), Implicit predictor-corrector central finite difference scheme for the equations of magnetohydrodynamic simulations, *Comput. Phys. Commun. 196*, 1--12; MR3398969, doi:10.1016/j.cpc.2015.05.001. (SCI).

5. <u>Lai, S. H.</u>*, and Ip W.-H. (2011), Interactions Between two MHD Kelvin-Helmholtz Instabilities, *Phys. Rev. E*, 84, 046413, doi:10.1103/PhysRevE.84.046413. (SCI).

6. <u>Lai, S. H.</u>*, and Lyu L. H. (2010), A Simulation and Theoretical Study of Energy Transport in the Event of MHD Kelvin-Helmholtz Instability, *J. Geophys. Res., 115*, A10215, doi:10.1029/2010JA015317 (SCI).

7. <u>Lai, S. H.</u> *, and Lyu L. H. (2008), Nonlinear evolution of the jet-flow-associated Kelvin-Helmholtz instability in MHD plasmas and the formation of Mach-cone-like plane waves, *J. Geophys. Res., 113*, A06217, doi:10.1029/2007JA012790 (SCI).

8. <u>Lai, S. H.</u>, and Lyu L. H. * (2006), Nonlinear evolution of the MHD Kelvin-Helmholtz instability in a compressible plasma, *J. Geophys. Res., 111*, A01202, doi:10.1029/2004JA010724 (SCI).

Journal paper in preparation (2024)

1. <u>Lai, S. H.</u>, Y.-C. Wang, Yang Y.-H.*, and Ip W.-H. (2024), Solar Wind – Magnetosphere Coupling via Kelvin-Helmholtz Instability at Mercury, *in preparation (> 50%)*.

2. <u>Lai, S. H.</u>, Yang Y.-H.*, and C.-W. Huang (2024), A Comprehensive Study of Extremely Low Mach-number Solar Wind at Mercury by BepiColombo Mission, *in preparation (< 50%)*.

Conference paper

1. Tamayo-Mas E., Harrington J. F, Shao H., Dagher E., Lee J., Kim K., Rutqvist J., Lai S. H., Chittenden N., Wang Y., Damians I.P. and Olivella S. (2018). Numerical modelling of gas flow in a compact clay barrier for DECOVALEX-2019. *International Discrete Fracture Network Engineering Conference*, Seattle, USA. [The order of authors is according to the order of reports by countries]

2. Harrington J. F., Tamayo-Mas E., Shao H., Dagher E., Lee J., Kim K., Lai S. H., Chittenden N., Wang Y. Damians I.P. and Olivella S. (2019), Modelling advective gas flow in a compact clay: application and assessment of different numerical approaches, *Keynote Lecture of the 6th Europoean Association of Geoscientists &Engineers Shale Workshop*, 29 April-2 May, France. [The order of authors is according to the order of reports by countries]

Technical report

1. Tamayo-Mas E., Harrington J. F., Brüning T., Kolditz O., Shao H., Dagher E. E., Lee J., Kim K., Rutqvist J., Lai S. H., Chittenden N., Wang Y., Damians I.P. and Olivella S. (2018), *DECOVALEX-2019 project: Task A - modElliNg Gas INjection ExpERiments (ENGINEER), Report* - British Geological Survey, 36pp. (OR/18/049). [The order of authors is according to the order of reports by countries]

2. Tamayo-Mas, E., Harrington, J. F., Brüning, T., Kolditz, O., Shao, H., Dagher, E. E., Lee, C., Lee, J., Kim, Kunhwi, Lai, S. H., Chittenden, N., Wang, Y., Damians, I. P., and Olivella, S. (2020), *Decovalex-2019 (Task A Final Report)*. Lawrence Berkeley National Lab. (LBNL), Berkeley, United States: N. p., 2020. Web. DOI:10.2172/1762801. [The order of authors is according to the order of reports by countries]

3. Gour-Tsyh Yeh, Chia-Hsing Tsai, Shu-Jing Jan, Chia-Wei Kuo, Shu-Hua Lai, Wan-Jung Kuo, and Chung-Yi Lin, Ming-Hsu Li (2019), *HYDROGEOCHEM 4.3: A Coupled Model of Fluid Flow, Thermal Transport, HYDROGEOCHEMical Transport, and Geo-mechanical Deformation through Saturated-Unsaturated Media - Version 4.3 (A Two-Dimensional Model) Theoretical Basis and Numerical Approximation (Technical Report)*, National Central University Zhongli, Taoyuan 32001, TAIWAN.

4. Gour-Tsyh Yeh, Chia-Hsing Tsai, Shu-Jing Jan, Chia-Wei Kuo, Shu-Hua Lai, Wan-Jung Kuo, and Chung-Yi Lin, Ming-Hsu Li (2019), HYDROGEOCHEM 5.3: *A Coupled Model of Fluid Flow, Thermal Transport, HYDROGEOCHEMical Transport, and Geo-mechanical Deformation through Saturated-Unsaturated Media - Version 5.3 (A Three-Dimensional Model) Theoretical Basis and Numerical Approximation (Technical Report)*, National Central University Zhongli, Taoyuan 32001, TAIWAN.

5. 用過核子燃料最終處置計畫─安全評估分析及系統模式技術之平行驗證成果報告 (2019)，台灣電力股份有限公司

6. 建置底泥品質分布預估模式及預防管理平台計畫成果報告 (2022)，行政院環境保護署