Chen Liu

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Professional experience

Jul 2021 – Present	Golomb Visiting Assistant Professor, Department of Mathematics, Purdue University
Oct 2019 – Jul 2021	Research Geophysicist, CGG Services (U.S.) Inc.
Jul 2019 – Jun 2020	Visiting Researcher, Department of Computational and Applied Mathematics, Rice University
May 2016 – Aug 2016	Summer internship in Computation and Modeling at Shell International E&P, Inc.

Education

Rice University

May 2016 – May 2019	Ph.D. in Computational and Applied Mathematics
Aug 2014 – May 2016	M.A. in Computational and Applied Mathematics
	Advisor: Prof. Béatrice M. Rivière

Peking University

Sep 2012 – Jul 2014	M.S. in Applied Statistics
	Advisor: Prof. Hao Ge

Nankai University

Sep 2008 – Jun 2012	Double Degrees, B.S. in Pharmacy and B.S. in Information and Numerical Science

Publications and communications

Theses

C. Liu (2019). "Discontinuous Galerkin methods for pore-scale multiphase flow: theoretical analysis and simulation." PhD thesis. Rice University.

C. Liu (2016). "Pore-scale simulation of fluid flow using discontinuous Galerkin methods." MA thesis. Rice University.

C. Liu (2014). "Coarse-grained model for studying DNA mediated allosteric phenomenon." MA thesis. Peking University.

Journal publications

1. **C. Liu**, D. Ray, C. Thiele, L. Lin, and B. Rivière (2020). "A pressure-correction and bound-preserving discretization of the phase-field method for variable density two-phase flows." *Submitted*. arXiv preprint arXiv:2010.16044.

2. D. Ray, **C. Liu**, and B. Rivière (2021). "A discontinuous Galerkin method for a diffuse-interface model of immiscible two-phase flows with soluble surfactant." *Computational Geosciences*. DOI: 10.1007/s10596-021-10073-y.

3. **C. Liu**, F. Frank, C. Thiele, F. O. Alpak, S. Berg, W. Chapman, and B. Rivière (2020). "An efficient numerical algorithm for solving viscosity contrast Cahn–Hilliard–Navier–Stokes system in porous media." *Journal of Computational Physics*, 400, p. 108948. DOI: 10.1016/j.jcp.2019.108948.

4. **C. Liu** and B. Rivière (2020). "A priori error analysis of a discontinuous Galerkin method for Cahn–Hilliard–Navier–Stokes equations." *CSIAM Transactions on Applied Mathematics*, 1(1), pp. 104–141. DOI: 10.4208/csiam-am.2020-0005.

5. **C. Liu**, F. Frank, F. O. Alpak, and B. Rivière (2019). "An interior penalty discontinuous Galerkin approach for 3D incompressible Navier–Stokes equation for permeability estimation of porous media." *Journal of Computational Physics*, 396, pp. 669–686. DOI: 10.1016/j.jcp.2019.06.052.

6. **C. Liu**, F. Frank, and B. Rivière (2019). "Numerical error analysis for non-symmetric interior penalty discontinuous Galerkin method of Cahn–Hilliard equation." *Numerical Methods for Partial Differential Equations*, 35(4), pp. 1509–1537. DOI: 10.1002/num.22362.

7. F. Frank, **C. Liu**, A. Scanziani, F. O. Alpak, and B. Rivière (2018). "An energy-based equilibrium contact angle boundary condition on jagged surfaces for phase-field methods." *Journal of Colloid and Interface Science*, 523, pp. 282–291. DOI: 10.1016/j.jcis.2018.02.075.

8. F. Frank, **C. Liu**, F. O. Alpak, S. Berg, and B. Rivière (2018). "Direct numerical simulation of flow on pore-scale images using the phase-field method." *SPE Journal*, 23(5), pp. 1833–1850. DOI: 10.2118/182607-PA.

9. F. Frank, **C. Liu**, F. O. Alpak, and B. Rivière (2018). "A finite volume/discontinuous Galerkin method for the advective Cahn–Hilliard equation with degenerate mobility on porous domains stemming from micro-CT imaging." *Computational Geosciences*, 22(2), pp. 543–563. DOI: 10.1007/s10596-017-9709-1.

Conference proceedings

1. F. Frank, **C. Liu**, F. O. Alpak, M. Araya-Polo, and B. Rivière (2017). "A discontinuous Galerkin finite element framework for the direct numerical simulation of flow on high-resolution pore-scale images." *SPE Reservoir Simulation Conference*. Society of Petroleum Engineers. DOI: 10.2118/182607-MS.

Talks

1. "Discontinuous Galerkin methods for solving non-Newtonian two-phase pore scale flows". Mar 13, 2019, SIAM Conference on Mathematical & Computational Issues in the Geosciences, Houston, TX, USA.

2. "Numerical studies of a discontinuous Galerkin scheme for a diffusive interface phase-field model". Mar 01, 2019, Finite Element Rodeo, UT Austin, Austin, TX, USA.

3. "Theoretical analysis of a symmetric discontinuous Galerkin method for solving Cahn–Hilliard–Navier–Stokes equations". Feb 16, 2019, SCALA 2019: Scientific Computing Around Louisiana, Tulane University, New Orleans, LA, USA.

4. "Simulation of two-phase flow by diffuse interface methods". May 16, 2018, InterPore 10th Annual Meeting and Jubilee Conference, New Orleans, LA, USA.

5. "Numerical simulations of incompressible Navier–Stokes equations and Cahn–Hilliard–Navier–Stokes equations at pore-scale". Feb 23, 2018, Finite Element Rodeo, Louisiana State University, Baton Rouge, LA, USA.

6. "A discontinuous Galerkin method for the coupled Navier–Stokes and Cahn–Hilliard equations". Sep 22, 2017, Texas Applied Mathematics and Engineering Symposium, UT Austin, Austin, TX, USA.

7. "A discontinuous Galerkin framework for the direct numerical simulation of flow on high-resolution pore-scale images". Mar 03, 2017, Finite Element Rodeo, Houston University, Houston, TX, USA.

8. "Discontinuous Galerkin approximation for 3D compressible momentum balance equations". Mar 05, 2016, Finite Element Rodeo, TAMU, College Station, TX, USA.

Posters

1. **C. Liu**, L. Lin, F. O. Alpak, S. Berg, and B. Rivière (2019). *Poster: Multiphase fluid flow simulator with applications in porous media*. Oil & Gas HPC Conference, Houston, TX, USA.

2. **C. Liu**, F. Frank, F. O. Alpak, and B. Rivière (2018b). *Poster: One-component single-phase flow simulator and two-component binary flow simulator with applications in porous media*. Offshore Technology Conference, Houston, TX, USA.

3. **C. Liu**, F. Frank, F. O. Alpak, and B. Rivière (2018a). *Poster: Numerical simulations of the Cahn–Hilliard–Navier–Stokes system at the pore scale*. Oil & Gas HPC Conference, Houston, TX, USA.

4. **C. Liu**, F. Frank, F. O. Alpak, and B. Rivière (2017). *Poster: A discontinuous Galerkin method for the direct numerical simulation of flow on porous medium*. Oil & Gas HPC Conference, Houston, TX, USA.

5. **C. Liu**, B. Rivière, F. O. Alpak, and F. Frank (2016). *Poster: Discontinuous Galerkin approximation of the compressible Navier–Stokes equation at pore scale*. Oil & Gas HPC Conference, Houston, TX, USA.

Workshops participation

Apr 20, 2017 – Apr 21, 2017 Digital Rock Project Workshop on Pore-Scale Flow Simulation – Integration of Simulation, Experimentation, and Imaging Processes. Houston, TX, USA.

Teaching experience

Purdue University

Aug 2021 – Dec 2021 Instructor for MA 26600 Ordinary Differential Equations

Rice University

Jan 2018 – May 2018 Teaching assistant for CAAM 335 Matrix Analysis, Class size: 73 undergraduates

Aug 2016 – Dec 2016 Teaching assistant for CAAM 335 Matrix Analysis, Class size: 81 undergraduates

Peking University

Feb 2014 – Jun 2014 Teaching assistant for Clinical Trial Design and Analysis, Class size: 22 graduates

Sep 2013 – Jan 2014 Teaching assistant for Probability and Statistics (B), Class size: 130 undergraduates

Professional service

2020 – Present Reviewer for: Journal of Computational and Applied Mathematics, SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing.

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