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EDUCATION

Ph.D. in Computational and Applied Mathematics, the University of Texas at Austin
2006 - 2010

◇ Advisor: Leszek Demkowicz, Serge Prudhomme
M.S. in Mathematics, University of Alabama in Huntsville 2005 - 2006
B.S. in Mathematics, Shanghai Normal University 1996 - 2000

EMPLOYMENT

Professor July 2024 - present
Department of Mathematics, City University of Hong Kong
Associate Professor July 2018 - June 2024
Department of Mathematics, City University of Hong Kong
Assistant Professor August 2012 - June 2018
Department of Mathematics, City University of Hong Kong
IMA Postdoctoral associate 2010 - 2012
Institute for Mathematics and its applications, University of Minnesota, Minneapolis
◇ Mentor: Bernardo Cockburn

RESEARCH INTEREST

Numerical analysis, discontinuous Galerkin methods, time-harmonic problems with high wave number, fully nonlinear PDEs

GRANTS

◇ RGC GRF-11300621 “Hybridizable Discontinuous Galerkin Approximation for the Biharmonic Operator and Some Applications”, PI, 2022-2024
◇ RGC GRF-11302219 “Hybridizable Discontinuous Galerkin Approximation for Second Order Elliptic Operator in Non-divergence Form and Some Applications”, PI, 2020-2022
◇ RGC GRF-11304017 “Hybridizable discontinuous Galerkin approximation of the Maxwell operator and some applications”, PI, 2018-2020
◇ RGC GRF-11302014 “New HDG methods for fluid dynamics and continuum mechanics”, PI, 2015-2018
◇ RGC ECS-109713 “Discontinuous Petrov-Galerkin Methods for Partial Differential Equations with Singular Perturbation”, PI, 2014-2016

◇ CityU SRG-7200324 “Discontinuous Petrov-Galerkin Methods for Partial Differential Equations”, PI, 2013-2015

PUBLICATIONS

Peer Refereed Journals (under review):

1. X. ZHONG AND W. QIU (202x). Analysis of a narrow-stencil discontinuous Galerkin method for second order linear non-divergence form elliptic PDEs. submitted.
2. W. QIU, J. REN, K. SHI AND Y. XU (202x). A Non-gradient DG method for second-order Elliptic Equations in the Non-divergence Form. submitted.

Peer Refereed Journals (published/accepted):

1. B. LI, S. MA AND W. QIU (2025). Optimal convergence of the arbitrary Lagrangian–Eulerian interface tracking method for two-phase Navier–Stokes flow without surface tension. *IMA Journal of Numerical Analysis*, accepted.
2. S. MA, W. QIU AND X. YANG (2024). Error Analysis with Polynomial Dependence on ϵ^{-1} in SAV Methods for the Cahn-Hilliard Equation. *Journal of Scientific Computing*, 101(83).
3. W. QIU AND L. ZHAO (2024). $H(\text{div})$ -conforming HDG methods for the stress-velocity formulation of the Stokes equations and the Navier–Stokes equations. *Numerische Mathematik*, 156, 1639 - 1678.
4. X. ZHONG AND W. QIU (2024). Analysis of a Narrow-Stencil Finite Difference Method for Approximating Viscosity Solutions of Fully Nonlinear Second Order Parabolic PDEs. *Journal of Scientific Computing*, 99(3), 76.
5. B. LI, W. QIU, Y. XIE AND W. YU (2024). Weak discrete maximum principle of isoparametric finite element methods in curvilinear polyhedra. *Mathematics of Computation*, 93(345), 1 - 34.
6. X. ZHONG AND W. QIU (2023). Spectral analysis of a mixed method for linear elasticity. *SIAM Journal on Numerical Analysis*, 61(4), 1885 - 1917.
7. W. QIU (2023). An enriched Ciarlet-Raviart scheme for the biharmonic equation. *Communications on Analysis and Computation*, 1(1), 1 - 11.
8. H. GAO AND W. QIU (2023). A new error analysis and post-processing technique of the lowest-order Raviart–Thomas mixed finite element method for parabolic problems. *Computers and Mathematics with Applications*, 133, 174-188.
9. Y. HUANG, W. QIU AND W. SUN (2023). New analysis of Mixed finite element methods for incompressible Magnetohydrodynamics. *Journal of Scientific Computing*, 95(3), 72.
10. H. GAO, W. QIU AND W. SUN (2023). New analysis of Mixed FEMs for Dynamical Incompressible Magnetohydrodynamics. *Numerische Mathematik*, 153(2), 327 - 358.

11. W. QIU AND L. TANG (2023). Global $W^{2,p}$ estimates for elliptic equations in the non-divergence form. *Proceeding of American Mathematical Society*, 151, 763-770.
12. H. CHEN, W. QIU AND J. LI (2022). A C^0 interior penalty method for m th-Laplace equation. *ESAIM: Mathematical Modelling and Numerical Analysis*, 56(6), 2081 - 2103.
13. H. CHEN, W. QIU AND A. PANI (2022). A mixed finite element scheme for biharmonic equation with variable coefficient and von Kármán equations. *Communications in Computational Physics*, 31(5), 1434-1466.
14. B. LI, W. QIU, Z. YANG (2022). A Convergent Post-processed Discontinuous Galerkin Method for Incompressible Flow with Variable Density. *Journal of Scientific Computing*, 91(1), 2.
15. G. CHEN, W. QIU AND L. XU (2021). Analysis of an interior penalty DG method for the quad-curl problem. *IMA Journal of Numerical Analysis*, 41(4), 2990-3023.
16. H. GAO AND W. QIU (2021). The Pointwise Stabilities of Piecewise Linear Finite Element Method on Non-obtuse Tetrahedral Meshes of Nonconvex Polyhedra. *Journal of Scientific Computing*, 87, 1 - 5.
17. H. CHEN, J. LI, W. QIU AND C. WANG (2021). A Mixed Finite Element Scheme for Quad-Curl Source and Eigenvalue Problems. *Communications in Computational Physics*, 29(4), 1125-1151.
18. W. QIU AND S. ZHANG (2020). Adaptive First-Order System Least-Squares Finite Element Methods for Second Order Elliptic Equations in Non-Divergence Form. *SIAM Journal on Numerical Analysis*, 58(6), 3286-3308.
19. W. QIU AND K. SHI (2020). Analysis of a semi-implicit structure-preserving finite element method for the nonstationary incompressible Magnetohydrodynamics equations. *Computers and Mathematics with Applications*, 80(10), 2150-2161.
20. W. QIU AND L. TANG (2020). A note on the Monge-Ampère type equations with general source terms. *Mathematics of Computation*, 89(326), 2675-2706.
21. W. QIU AND L. TANG (2020). On a class of generalized Monge-Ampère type equations. *Communications in Contemporary Mathematics*, 22(5).
22. W. QIU AND K. SHI (2020). A Mixed DG method and an HDG method for incompressible magnetohydrodynamics. *IMA Journal of Numerical Analysis*, 40(2), 1356-1389.
23. K. HU, W. QIU, K. SHI (2020). Convergence of a B-E based finite element method for MHD models on Lipschitz domains. *Journal of Computational and Applied Mathematics*, 368, 145-162.
24. W. QIU AND K. SHI (2019). Analysis on an HDG method for the p -Laplacian equations. *Journal of Scientific Computing*, 80, 1019-1032.
25. H. GAO AND W. QIU (2019). A semi-implicit energy conserving finite element method for the dynamical incompressible magnetohydrodynamics equations. *Computer Methods in Applied Mechanics and Engineering*, 346, 982-1001.

26. G FU, Y. JIN AND W. QIU (2019). Parameter-free superconvergent $H(\text{div})$ -conforming HDG methods for the Brinkman equations. *IMA Journal of Numerical Analysis*, 39(6), 957-982.
27. B. COCKBURN, G. FU AND W. QIU (2018). Discrete H^1 -inequalities for spaces admitting M-decompositions. *SIAM Journal on Numerical Analysis*, 56(6), 3407-3429.
28. H. GAO AND W. QIU (2018). Error analysis of mixed finite element methods for nonlinear parabolic equations. *Journal of Scientific Computing*, 77, 1660-1678.
29. H. CHEN, W. QIU AND K. SHI (2018). A priori and computable a posteriori error estimates for an HDG method for the coercive Maxwell equations. *Computer Methods in Applied Mechanics and Engineering*, 333, 287-310.
30. W. QIU, J. SHEN AND K. SHI (2018). An HDG method for linear elasticity with strong symmetric stresses. *Mathematics of Computation*, 87(309), 69-93.
31. B. COCKBURN, G. FU AND W. QIU (2017). A note on the devising of superconvergent HDG methods for Stokes flow by M-decompositions. *IMA Journal of Numerical Analysis*, 37(2), 730-749.
32. A. CESMELIOGLU, B. COCKBURN AND W. QIU (2017). Analysis of a Hybridizable Discontinuous Galerkin method for the steady-state incompressible Navier-Stokes equations. *Mathematics of Computation*, 86(306), 1643-1670.
33. P. LU, H. CHEN AND W. QIU (2017). An absolutely stable hp -HDG method for the time-harmonic Maxwell equations with high wave number. *Mathematics of Computation*, 86(306), 1553-1577.
34. E.T. CHUNG AND W. QIU (2017). Analysis of a SDG method for the incompressible Navier-Stokes equations. *SIAM Journal on Numerical Analysis*, 55(2), 543-569.
35. H. CHEN, W. QIU, K. SHI AND M. SOLANO (2017). A Superconvergent HDG method for the Maxwell equations. *Journal of Scientific Computing*, 70(3), 1010-1029.
36. H. CHEN AND W. QIU (2017). A first order system least squares method for the Helmholtz equation. *Journal of Computational and Applied Mathematics*, 309, 145-162.
37. W. QIU, M. SOLANO AND P. VEGA (2016). A high order HDG method for curved-interface problems via approximations from straight Triangulations. *Journal of Scientific Computing*, 69(3), 1384-1407.
38. W. QIU AND K. SHI (2016). A superconvergent HDG method for the incompressible Navier-Stokes equations on general polyhedral meshes. *IMA Journal of Numerical Analysis*, 36(4), 1943-1967.
39. W. QIU, M. WANG AND J. ZHANG (2016). Direct computation of stresses in linear elasticity. *Journal of Computational and Applied Mathematics*, 292, 363-368.
40. W. QIU AND K. SHI (2016). An HDG method for convection diffusion equation. *Journal of Scientific Computing*, 66(1), 346-357.

41. H. CHEN, J. LI AND W. QIU (2016). Robust a posteriori error estimates for HDG method for convection–diffusion equations. *IMA Journal of Numerical Analysis*, 36(1), 437-462.
42. Z. WANG, W. QIU, Y. YANG, C.T. LIU (2015). Atomic-size and lattice-distortion effects in newly developed high-entropy alloys with multiple principal elements. *Intermetallics*, 64, 63-69.
43. D. ARNOLD, G. AWANOU AND W. QIU (2015). Mixed finite elements for elasticity on quadrilateral meshes. *Advances in Computational Mathematics*, 41(3), 553-572.
44. G. FU, W. QIU AND W. ZHANG (2015). An analysis of HDG methods for convection-dominated diffusion problems. *ESAIM: Mathematical Modelling and Numerical Analysis*, 49(1), 225-256.
45. H. CHEN, G. FU, J. LI AND W. QIU (2014). First order least squares method with weakly imposed boundary condition for convection dominated diffusion problems. *Computers and Mathematics with Applications*, 68(12), 1635-1652.
46. J. CHAN, J.A. EVANS AND W. QIU (2014). A dual Petrov–Galerkin finite element method for the convection–diffusion equation. *Computers and Mathematics with Applications*, 68(11), 1513-1529.
47. B. COCKBURN, W. QIU AND M. SOLANO (2014). A priori error analysis for HDG methods using extensions from subdomains to achieve boundary conformity. *Mathematics of Computation*, 83(286), 665-699.
48. J. GOPALAKRISHNAN AND W. QIU (2014). An analysis of the practical DPG method. *Mathematics of Computation*, 83(286), 537-552.
49. B. COCKBURN AND W. QIU (2014). Commuting diagrams for the TNT elements on cubes. *Mathematics of Computation*, 83(286), 603-633.
50. J. BRAMWELL, L. DEMKOWICZ, J. GOPALAKRISHNAN AND W. QIU (2012). A locking-free hp DPG method for linear elasticity with symmetric stresses. *Numerische Mathematik*, 122(4), 671-707.
51. B. COCKBURN, W. QIU AND K. SHI (2012). Superconvergent HDG methods on isoparametric elements for second-order elliptic problems. *SIAM Journal on Numerical Analysis*, 50(3), 1417-1432.
52. J. GOPALAKRISHNAN AND W. QIU (2012). Partial expansion of a Lipschitz domain and some applications. *Frontiers of Mathematics in China*, 7(2), 249-272.
53. B. COCKBURN, W. QIU AND K. SHI (2012). Conditions for superconvergence of HDG methods for second-order elliptic problems. *Mathematics of Computation*, 81(279), 1327-1353.
54. W. QIU AND L. DEMKOWICZ (2011). Mixed hp -finite element method for linear elasticity with weakly imposed symmetry: stability analysis. *SIAM Journal on Numerical Analysis*, 49(2), 619-641.

55. W. QIU AND L. DEMKOWICZ (2011). Mixed variable order h-finite element method for linear elasticity with weakly imposed symmetry. Curvilinear elements in 2D. *Computational Methods in Applied Mathematics*, 11(4), 510-539.
56. W. QIU AND L. DEMKOWICZ (2009). Mixed hp-finite element method for linear elasticity with weakly imposed symmetry. *Computer Methods in Applied Mechanics and Engineering*, 198(47), 3682-3701.
57. L. DEMKOWICZ, P. GATTO, W. QIU AND A. JOPLIN (2009). G^1 -interpolation and geometry reconstruction for higher order finite elements. *Computer Methods in Applied Mechanics and Engineering*, 198(13), 1198-1212.
58. S. WU AND W. QIU (2009). Nonlinear transient dynamic analysis by explicit finite element with iterative consistent mass matrix. *Communications in numerical methods in engineering*, 25(3), 201-217.
59. P. YU, W. QIU AND D.Z. PAN (2008). Fast lithography image simulation by exploiting symmetries in lithography systems. *IEEE Transactions on Semiconductor Manufacturing*, 21(4), 638-645.
60. M. FRIEDMAN AND W. QIU (2008). On the location and continuation of Hopf bifurcations in large-scale problems. *International Journal of Bifurcation and Chaos*, 18(5), 1589-1597.