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EMPLOYMENT

Brown University: 2007.7–
Professor: 2017.7–
Associate Professor: 2012.7–2017.6
Assistant Professor: 2007.7–2012.6
Member of the Lefschetz Center for Dynamical Systems.

University of Pennsylvania: 2010.9–2010.12
Visiting scholar (Sabbatical).

Institute for Advanced Study: 2006.9–2007.6, 2008.9–2008.12, 2021.9–2022.6
Member & Visiting Scholar.

Mathematical Sciences Research Institute: 2007.7–2007.8
Member of "Summer Microprogram on Nonlinear Partial Differential Equations".

University of Chicago: 2005.9–2006.8
L.E. Dickson Instructor & Research post-doctor.

University of Minnesota: 2001.9–2005.8.
Research Assistant & Teaching Assistant.

EDUCATION

University of Minnesota: 2001.9–2005.8
Ph.D. in Mathematics.
Thesis advisor: Professor Nicolai V. Krylov.

Fudan University: 1997.9–2001.7
B.S. in Mathematics.
Thesis advisor: Professor Jiaxing Hong.

RESEARCH INTERESTS

Partial Differential Equations: nonlinear elliptic and parabolic PDEs, Navier-Stokes equations and related equations, reaction diffusion equations, unique continuation problems, solvability of PDEs with rough coefficients.

Probability: probabilistic approach of PDEs, stochastic processes, stochastic control theory.

Numerical Analysis: rates of convergence of finite difference approximations.

Date: November 20, 2022.

PUBLICATIONS

1. About smoothness of solutions of the heat equations in closed smooth space-time domains, *Comm. Pure Appl. Math.* **58** (2005) no. 6, 799–820.

2. On the rate of convergence of finite-difference approximations for Bellman's equations with constant coefficients, with N.V. Krylov, *Algebra i Analis (St. Petersburg Math. J.)* **17** (2005), no. 2, 108–132.

3. On the local smoothness of solutions of the Navier-Stokes equations, with D. Du, *J. Math. Fluid Mech.* **9** (2007), no. 2, 139–152.

4. Rate of convergence of finite-difference approximations for degenerate linear parabolic equations with C^1 and C^2 coefficients, with N.V. Krylov, *Electro. J. Differential Equations* **2005** (2005), no. 102, 1–25.

5. Hessian equations with elementary symmetric functions, *Comm. Partial Differential Equations.* **31** (2006) no. 7, 1005–1025.

6. On time-inhomogeneous controlled diffusion processes in domains, with N.V. Krylov, *Annal. Prob.* **35** (2007), no. 1, 206–227.

7. The rate of convergence of finite-difference approximations for Bellman equations with Lipschitz coefficients in domains, with N.V. Krylov, *Appl. Math. Optim.* **56** (2007), no. 1, 37–66.

8. Unique continuation for the schrödinger equation with gradient vector potentials, with W. Staubach, *Proc. Amer. Math. Soc.* **135** (2007), no. 7, 2141–2149.

9. On uniqueness of boundary blow-up solutions of a class of nonlinear elliptic equations, with S. Kim and M.V. Safonov, *Comm. Partial Differential Equations* **33** (2008), no. 2, 177–188.

10. Partial regularity of weak solutions of the Navier-Stokes equations in $\mathbb{R}^4$ at the first blow-up time, with D. Du, *Comm. Math. Phys.* **273** (2007), no. 3, 785–801.

11. Spatial analyticity of the solutions to the sub-critical dissipative Quasi-geostrophic equations, with D. Li, *Arch. Rational Mech. Anal.* **189** (2008), no. 1, 131–158.

12. Global well-posedness and a decay estimate for the critical dissipative quasi-geostrophic equation, with D. Du, *Discrete Contin. Dyn. Syst.* **21** (2008), no. 4, 1095–1101.

13. Finite time singularities for a class of generalized surface quasi-geostrophic equations, with D. Li, *Proc. Amer. Math. Soc.* **136** (2008), no. 7, 2555–2563.

14. On the Green's matrices of strongly parabolic systems of second order, with S. Cho and S. Kim, *Indiana Univ. Math. J.* **57** (2008), no. 4, 1633–1678.

15. Optimal local smoothing and analyticity rate estimates for the generalized Navier-Stokes equations, with D. Li, *Comm. Math. Sci.* **7** (2009), no. 1, 67–80.

16. Green's matrices of second order elliptic systems with measurable coefficients in two dimensional domains, with S. Kim, *Trans. Amer. Math. Soc.* **361** (2009), no. 6, 3303–3323.

17. Well-posedness for a transport equation with nonlocal velocity, *J. Funct. Anal.* **255** (2008), no. 11, 3070–3097.

18. A regularity criterion for the dissipative quasi-geostrophic equations, with N. Pavlović, *Ann. Inst. H. Poincare Anal. Non Lineaire* **26** (2009), no. 5, 1607–1619.

19. Finite time singularities and global well-posedness for fractal Burgers' equation, with D. Du and D. Li, *Indiana Univ. Math. J.* **58** (2009), no. 2, 807–821.

20. Dissipative quasi-geostrophic equations in critical Sobolev spaces: smoothing effect and global well-posedness, *Discrete Contin. Dyn. Syst.* **26** (2010) no. 3, 1197–1211.

21. Regularity criteria for the dissipative quasi-geostrophic equations in Hölder spaces, with N. Pavlović, *Comm. Math. Phys.* **290** (2009), no. 3, 801–812.

22. Elliptic equations in divergence form with partially BMO coefficients, with D. Kim, *Arch. Rational Mech. Anal.* **196** (2010), no. 1, 25–70.

23. The Navier-Stokes equations in the critical Lebesgue space, with D. Du, *Comm. Math. Phys.* **292** (2009), no. 3, 811–827.

24. Second-order elliptic and parabolic equations with $B(\mathbb{R}^2, VMO)$ coefficients, with N. V. Krylov, *Trans. Amer. Math. Soc.* **362** (2010), no. 12, 6477–6494.

25. Parabolic and elliptic systems with VMO coefficients, with D. Kim, *Methods Appl. Anal.* **16** (2009), no. 3, 365–388.

26. Solvability of parabolic equations in divergence form with partially VMO coefficients, *J. Funct. Anal.* **258** (2010), no. 7, 2145–2172.

27. Parabolic equations with variably partially VMO coefficients, *Algebra i Analis (St. Petersburg Math. J.)* **23** (2011) no. 3, 150–174.

28. Partial Schauder estimate for second-order elliptic and parabolic equations, with S. Kim, *Calc. Var. Partial Differential Equations*, **40** (2011) no. 3–4, 481–500.

29. On the 2D critical and supercritical dissipative quasi-geostrophic equation in Besov spaces, with D. Li, *J. Differential Equations* **248** (2010), no. 11, 2684–2702.

30. L_p solvability of divergence type parabolic and elliptic systems with partially BMO coefficients, with D. Kim, *Calc. Var. Partial Differential Equations* **40** (2011) no. 3–4, 357–389.

31. On the L_p-solvability of higher order parabolic and elliptic systems with BMO coefficients, with D. Kim, *Arch. Rational Mech. Anal.* **199** (2011) no. 3, 889–941.

32. Solvability of second-order equations with hierarchically partially BMO coefficients, *Trans. Amer. Math. Soc.*, **364** (2012) no. 1, 493–517.

33. The aggregation equation with power-law kernels: ill-posedness, mass concentration and similarity solutions, *Comm. Math. Phys.* **304** (2011) no. 3, 649–664.

34. Parabolic and elliptic systems in divergence form with variably partially BMO coefficients, with D. Kim, *SIAM J. Math. Anal.*, **43** (2011) no. 3, 1075–1098.

35. On fully nonlinear elliptic and parabolic equations in domains with VMO coefficients, with N. V. Krylov and X. Li, *Algebra i Analis*, **24** (2012) no. 1, 53–94; English translation in *St. Petersburg Math. J.* **24** (2013), 39–69.

36. Global regularity of weak solutions to quasilinear elliptic and parabolic equations with controlled growth, with D. Kim, *Comm. Partial Differential Equations*, **36** (2011) no. 10, 1750–1777.

37. Global estimates for Green's matrix of second order parabolic systems with application to elliptic systems in two dimensional domains, with S. Cho and S. Kim, *Potential Anal.*, **36** (2012), no. 2, 339–372.

38. On similarity solutions to the multidimensional aggregation equation, *SIAM J. Math. Anal.*, **43** (2011) no. 4, 1995–2008.

39. Higher order elliptic and parabolic systems with variably partially BMO coefficients in regular and irregular domains, with D. Kim, *J. Funct. Anal.*, **261** (2011) no. 11, 3279–3327.

40. On L_p-estimates for a class of nonlocal elliptic equations, with D. Kim, *J. Funct. Anal.*, **262** (2012) no. 3, 1166–1199.

41. Gradient estimates for parabolic and elliptic systems from linear laminates, *Arch. Rational Mech. Anal.*, **205** (2012) no. 1, 119–149.

42. The conormal derivative problem for higher order elliptic systems with variably partially BMO coefficients, with D. Kim, *Contemp. Math.*, **581** (2012), 69–97.

43. Partial regularity of steady-state solutions to the 6D Navier-Stokes equations, with R. Strain, *Indiana Univ. Math. J.*, **61** (2012), no. 6, 2211–2229.

44. On the existence of smooth solutions for fully nonlinear parabolic equations with measurable "coefficients" without convexity assumptions, with N. V. Krylov, *Comm. Partial Differential Equations*, **38** (2013), no. 6, 1038–1068.

45. Schauder estimates for a class of nonlocal elliptic equations, with D. Kim, *Discrete Contin. Dyn. Syst.-A* **33** (2013) no. 6, 2319–2347.

46. Global $\dot{H}^1 \cap \dot{H}^{-1}$ solutions to a logarithmically regularized 2D Euler equation, with D. Li, *J. Math. Fluid Mech.* **17** (2015), no. 1, 1–7.

47. On a one-dimensional α-patch model with nonlocal drift and fractional dissipation, with D. Li, *Trans. Amer. Math. Soc.*, **366** (2014), no. 4, 2041–2061.

48. On elliptic equations in a half space or in convex wedges with irregular coefficients, *Adv. Math.*, **238** (2013), 24–49.

49. On a generalized maximum principle for a transport-diffusion model with log-modulated fractional dissipation, with D. Li, *Discrete Contin. Dyn. Syst.-A* **34** (2013), no.9, 3437–3454.

50. Partial regularity of solutions to the four-dimensional Navier-Stokes equations, with X. Gu, *Dyn. Partial Differ. Equ.* **11** (2014), no. 1, 53–69.

51. Green's functions for parabolic systems of second order in time-varying domains, with S. Kim, *Commun. Pure Appl. Anal.* **13** (2014), no. 4, 1407–1433.

52. Parabolic equations in simple convex polytopes with time irregular coefficients, with D. Kim, *SIAM J. Math. Anal.* **46** (2014), no. 3, 1789—1819.

53. On a multi-dimensional transport equation with nonlocal velocity, *Adv. Math.* **264** (2014), no. 20, 747–761.

54. Boundary partial regularity for the high dimensional Navier-Stokes equations, with X. Gu, *J. Funct. Anal.* **267** (2014), no. 8, 2606–2637.

55. On the impossibility of W_p^2 estimates for elliptic equations with piecewise constant coefficients, with D. Kim, *J. Funct. Anal.* **267** (2014), no. 10, 3963–3974.

56. Boundary gradient estimates for parabolic and elliptic systems from linear laminates, with J. Xiong, *Int. Math. Res. Not.* IMRN 2015, no. 17, 7734–7756.

57. Schauder estimates for higher-order parabolic systems with time irregular coefficients, with H. Zhang, *Calc. Var. Partial Differential Equations* **54** (2015), no. 1, 47–74.

58. Regularity of a degenerate parabolic equation appearing in Vecer's unified pricing of Asian options, with S. Kim, *Bull. Korean Math. Soc.* **52** (2015), no. 3, 947–953.

59. Boundary value problems for parabolic operators in a time-varying domain, with S. Cho and D. Kim, *Comm. Partial Differential Equations* **40** (2015), no. 7, 1282–1313.

60. Elliptic and parabolic equations with measurable coefficients in weighted Sobolev spaces, with D. Kim, *Adv. Math.* **274** (2015), 681–735.

61. On an elliptic equation arising from photo-acoustic imaging in inhomogeneous media, with H. Ammari, H. Kang, and S. Kim, *Int. Math. Res. Not.* **2015** (2015), no. 22, 12105–12113.

62. Conormal problem of higher-order parabolic systems with time irregular coefficients, with H. Zhang, *Trans. Amer. Math. Soc.*, (2016), no. 10, 7413–7460.

63. Neumann problem for non-divergence elliptic and parabolic equations with BMO_x coefficients in weighted Sobolev spaces, with D. Kim and H. Zhang, *Discrete Contin. Dyn. Syst.-A* **36** (2016), no. 9, 4895–4914.

64. On an elliptic equation arising from composite materials, with H. Zhang, *Arch. Rational Mech. Anal.* **222** (2016), no. 1, 47–89.

65. On C^1, C^2, and weak type-$(1,1)$ estimates for linear elliptic operators, with S. Kim, *Comm. Partial Differential Equations*, **42** (2017), no. 3, 417–435.

66. Partial Schauder estimates for second-order elliptic and parabolic equations: a revisit, with S. Kim, *Int. Math. Res. Not.*, 2019, no. 7, 2085–2136.

67. On L_p-estimates for elliptic and parabolic equations with A_p weights, with D. Kim, *Trans. Amer. Math. Soc.*, **370** (2018), no. 7, 5081–5130.

68. On Schauder estimates for a class of nonlocal fully nonlinear parabolic equations, with H. Zhang, *Calc. Var. Partial Differential Equations* **58** (2019), no. 2, Art. 40, 42 pp.

69. On C^1, C^2, and weak type-$(1,1)$ estimates for linear elliptic operators: part II, with L. Escauriaza and S. Kim, *Math. Ann.* (2018), no. 1–2, 447–489.

70. Dini estimates for nonlocal fully nonlinear elliptic equations, with H. Zhang, *Ann. Inst. H. Poincaré Anal. Non Linéaire* **35** (2018), no. 4, 971–992.

71. Higher-order elliptic and parabolic equations with VMO assumptions and general boundary conditions, with C. Gallarati, *J. Funct. Anal.* **274** (2018), no. 7, 1993–2038.

72. Fundamental solutions for second order parabolic systems with drift terms, with S. Kim, *Proc. Amer. Math. Soc.* **146** (2018), no. 7, 3019–3029.

73. Stationary Stokes systems with partially VMO coefficients in Reifenberg flat domains, with D. Kim, *J. Differential Equations* **264** (2018), no. 7, 4603–4649.

74. Dini estimates for nonlocal linear and nonlinear parabolic equations with drifts, with H. Zhang and T. Jin, *Anal. PDE*, **11** (2018), no. 6, 1487–1534.

75. Conormal derivative problems for stationary Stokes system in Sobolev spaces, with J. Choi and D. Kim, *Discrete Contin. Dyn. Syst.-A*, **38** (2018), no. 5, 2349–2374.

76. L_q-estimates for stationary Stokes systems with coefficients measurable in one direction, with D. Kim, *Bull. Math. Sci.* **9** (2019), no. 1, 1950004, 30 pp.

77. Higher-order parabolic equations with VMO assumptions and general boundary conditions with variable leading coefficients, with C. Gallarati, *Int. Math. Res. Not. IMRN*, 2020, no. 7, 2114–2144.

78. Gradient estimates for Stokes systems in domains, with J. Choi, *Dyn. Partial Differ. Equ.* **16** (2019), no. 1, 1–24.

79. Green functions of conormal derivative problems for stationary Stokes systems, with J. Choi and D. Kim, *J. Math. Fluid Mech.*, **20** (2018), no. 4, 1745–1769.

80. Optimal estimates for the conductivity problem by Green's function method, with H. Li, *Arch. Rational Mech. Anal.*, **231** (2019), no. 3, 1427–1453.

81. Gradient estimates for Stokes systems with Dini mean oscillation coefficients, with J. Choi, *J. Differential Equations* **266** (2019), no. 8, 4451–4509.

82. L_p-estimates for time fractional parabolic equations with coefficients measurable in time, with D. Kim, *Adv. Math.* **345** (2019), 289–345.

83. Exterior Problem of the Linear Vlasov-Poisson-Boltzmann System, with T. Yang and M. Zhong, *SIAM J. Math. Anal.* **51** (2019), no. 3, 1792–1823.

84. Gradient estimates for divergence form elliptic systems arising from composite material, with L. Xu, *SIAM J. Math. Anal.* **51** (2019), no. 3, 2444-2478.

85. On conormal and oblique derivative problem for elliptic equations with Dini mean oscillation coefficients, with S. Kim and J. Lee, *Indiana Univ. Math. J.*, 69 (2020), no. 6, 1815–1853.

86. Boundary regularity for the Naiver-Stokes equations in the critical Lebesgue spaces, with K. Wang, *Discrete Contin. Dyn. Syst.-A* **40** (2020), no. 9, 5289–5323.

87. Fully nonlinear elliptic and parabolic equations in weighted and mixed-norm Sobolev spaces, with N. V. Krylov, *Calc. Var. Partial Differential Equations* **58** (2019), no. 4, Paper No. 145.

88. Optimal regularity for a Dirichlet-conormal problem in Reifenberg flat domain, with J. Choi and Z. Li, *Appl. Math. Optim.*, 83 (2021), no. 3, 1547–1583.

89. L_p-estimates for time fractional parabolic equations in divergence form with measurable coefficients, with D. Kim, *J. Funct. Anal.* **278** (2020), no. 3, 108338.

90. Classical solutions of oblique derivative problem in nonsmooth domains with mean Dini coefficients, with Z. Li, *Trans. Amer. Math. Soc.* **373** (2020), no. 7, 4975–4997.

91. Green function for pressure of Stokes systems, with J. Choi, *Int. Math. Res. Not.*, 2021, no. 3, 1699–1759.

92. Boundary ε-regularity criteria for the 3D Navier-Stokes equations, with K. Wang, *SIAM J. Math. Anal.* **52** (2020), no. 2, 1290–1309.

93. Hessian estimates for non-divergence form elliptic equations arising from composite materials, with L. Xu, *Potential Anal.*, 54 (2021), no. 3, 409–449.

94. Weighted mixed-norm L_p-estimates for elliptic and parabolic equations in non-divergence form with singular degenerate coefficients, with T. Phan, *Rev. Mat. Iberoam.*, 37 (2021), no. 4, 1413–1440.

95. Hessian estimate for elliptic and parabolic equations involving p-Laplacian via a fundamental inequality, with Peng Fa, Yi Ru-Ya Zhang, Yuan Zhou, *Adv. Math.* **370** (2020), 107212, 40 pp.

96. Time analyticity for the heat equation and Navier-Stokes equations, with Q. S. Zhang, *J. Funct. Anal.* **79** (2020), no. 4, 108563, 15 pp.

97. On the W_p^2 estimate for oblique derivative problem in Lipschitz domains, with Z. Li, *Int. Math. Res. Not.*, to appear (2020).

98. Mixed-norm L_p-estimates for non-stationary Stokes systems with singular VMO coefficients and applications, with T. Phan, *J. Differential Equations* 276 (2021), 342–367.

99. Time analyticity for inhomogeneous parabolic equations and the Navier-Stokes equations in the half space, with X. Pan, *J. Math. Fluid Mech.* **22** (2020), no. 4, 53.

100. The Dirichlet-conormal problem with homogeneous and inhomogeneous boundary conditions, with Z. Li, *Comm. Partial Differential Equations*, 46 (2021), no. 3, 470–497.

101. On conormal derivative problem for parabolic equations with Dini mean oscillation coefficients, with X. Pan, *Discrete Contin. Dyn. Syst.* 41 (2021), no. 10, 4567–4592.

102. Regularity theory for parabolic equations with singular degenerate coefficients, with T. Phan, *Calc. Var. Partial Differential Equations*, 60 (2021), no. 1, Paper No. 44, 39 pp.

103. An approach for weighted mixed-norm estimates for parabolic equations with local and non-local time derivatives, with D. Kim, *Adv. Math.*, 377 (2021), 107494.

104. Nonlinear instability for the surface quasi-geostrophic equation in the supercritical regime, with A. Bulut, *Comm. Math. Phys.*, no. 3 (2021), 1679–1707.

105. Gradient estimates for divergence form parabolic systems from composite materials, with L. Xu, *Calc. Var. Partial Differential Equations*, 60 (2021), no. 3, Paper No. 98, 43 pp.

106. Existence and uniqueness of bounded stable solutions to the Peierls-Nabarro model for curved dislocations, with Y. Gao, *Calc. Var. Partial Differential Equations*, 60 (2021), no. 2, Paper No. 62, 26 pp.

107. The conormal and Robin boundary value problems in nonsmooth domains satisfying a measure condition, with Z. Li, *J. Funct. Anal.* 281 (2021), no. 9, 109167.

108. Parabolic and elliptic equations with singular or degenerate coefficients: the Dirichlet problem, with Tuoc Phan, *Trans. Amer. Math. Soc.*, 374 (2021), no. 9, 6611–6647.

109. A simple proof of regularity for $C^{1,\alpha}$ interface transmission problems, *Ann. Appl. Math.*, 37 (2021), pp. 22–30.

110. Green's function for nondivergence elliptic operators in two dimensions, with S. Kim, *SIAM J. Math. Anal.*, 53 (2021), no. 4, 4637–4656.

111. On $C^{1/2,1}$, $C^{1,2}$, and $C^{0,0}$ estimates for linear parabolic operators, with L. Escauriaza and S. Kim, *J. Evol. Equ.*, 21 (2021), no. 4, 4641–4702.

112. Time fractional parabolic equations with measurable coefficients and embeddings for fractional parabolic Sobolev spaces, with D. Kim, *Int. Math. Res. Not. IMRN* 2021, no. 21, 17563–17610.

113. Aleksandrov's estimates for elliptic equations with drift in Morrey spaces containing L_d, with N. V. Krylov, *Proc. Amer. Math. Soc.* **150** (2022), no. 4, 1641–1645.

114. Gradient estimates for Stokes and Navier-Stokes systems with piecewise DMO coefficients, with J. Choi and L. Xu, *SIAM J. Math. Anal.* **54** (2022), no. 3, 3609–3635.

115. Optimal regularity of mixed Dirichlet-conormal boundary value problems for parabolic operators, with Jongkeun Choi and Zongyuan Li, *SIAM J. Math. Anal.* **54** (2022), no. 2, 1393–1427.

116. Global well-posedness for the one-phase Muskat problem, with F. Gancedo and H. Q. Nguyen, *Comm. Pure Appl. Math.*, to appear (2022).

117. Global L_p estimates for kinetic Kolmogorov-Fokker-Planck equations in nondivergence form, with T. Yastrzhembskiy, *Arch. Rational Mech. Anal.* **245** (2022), no. 1, 501–564. 35

118. Kinetic Fokker-Planck and Landau Equations with Specular Reflection Boundary Condition, with Y. Guo and T. Yastrzhembskiy, *Kinet. Relat. Models*, 15 (2022), no. 3, 467–516.

119. Gradient estimates for singular parabolic p-Laplace type equations with measure data, with H. Zhu, *Calc. Var. Partial Differential Equations* **61** (2022), no. 3, Paper No. 86, 41 pp.

120. Boundary Lebesgue mixed-norm estimates for non-stationary Stokes systems with VMO coefficients, with D. Kim and T. Phan, *Comm. Partial Differential Equations* **47** (2022), no. 8, 1700–1731.

121. On parabolic and elliptic equations with singular or degenerate coefficients, with T. Phan, *Indiana Univ. Math. J.*, to appear (2022).

122. Note on Green's functions of non-divergence elliptic operators with continuous coefficients, with S. Kim and S. Lee, *Proc. Amer. Math. Soc.*, to appear (2022).

123. Optimal gradient estimates of solutions to the insulated conductivity problem in dimension greater than two, with Y.Y. Li and Z. Yang, *J. Eur. Math. Soc. (JEMS)*, to appear (2022).

124. The Vlasov-Poisson-Landau system with the specular-reflection boundary condition, with Y. Guo and Z. Ouyang, *Arch. Rational Mech. Anal.*, to appear (2022).

125. Weighted mixed norm estimates for fractional wave equations with VMO coefficients, with Y. Liu, *J. Differential Equations* **337** (2022), 168–254.

126. Gradient estimates for singular p-Laplace type equations with measure data, with H. Zhu, *J. Eur. Math. Soc. (JEMS)*, to appear (2022).

127. Estimates for fundamental solutions of parabolic equations in non-divergence form, with S. Kim and S. Lee, *J. Differential Equations* **340** (2022), 557–591.

128. Mixed boundary value problems for parabolic equations in Sobolev spaces with mixed-norms, with J. Choi and Z. Li, *Calc. Var. Partial Differential Equations* **62** (2023), no. 1, Paper No. 5.

129. The Dirichlet-conormal problem for the heat equation with inhomogeneous boundary conditions, with Z. Li, *Adv. Math.*, to appear (2022).

130. Time analyticity for fractional heat equations, with C. Zeng and Qi S. Zhang, *SIAM J. Math. Anal.*, to appear (2022).

131. Boundedness of non-local operators with spatially dependent coefficients and Lp-estimates for non-local equations, with P. Jung and D. Kim, *Calc. Var. Partial Differential Equations*, to appear (2022).

132. Optimal gradient estimates for the insulated conductivity problem: the non-umbilical case, with Y.Y. Li and Z. Yang, *J. Math. Pures Appl.* to appear (2022).

BOOK CHAPTERS AND SURVEY PAPERS

1. L_p estimates for parabolic equations, *Lectures on the Analysis of Nonlinear Partial Differential Equations*, Morningside Lectures in Mathematics, Vol. 4, (2016), 55–92.

2. Nonstandard Schauder estimates for parabolic equations, *Lectures on the Analysis of Nonlinear Partial Differential Equations*, Morningside Lectures in Mathematics, Vol. 5 (2017).

3. L_p estimates for Stokes systems, *Lectures on the Analysis of Nonlinear Partial Differential Equations*, Morningside Lectures in Mathematics, to appear (2021).

4. Recent progress in the L_p theory for elliptic and parabolic equations with discontinuous coefficients, *Analysis in Theory and Applications* **36**, no. 2, (2020), pp. 161–199.

PREPRINTS

1. On a family of exact solutions to the incompressible liquid crystals in two dimensions, with Z. Lei, preprint (2012).

2. Weighted mixed-norm L_p estimates for equations in non-divergence form with singular coefficients: the Dirichlet problem, with T. Phan, submitted (2020).

3. Degenerate linear parabolic equations in divergence form on the upper half space, with T. Phan and H. V. Tran, submitted (2021).

4. Regularity properties of passive scalars with rough divergence-free drifts, with D. Albritton, submitted (2021).

5. Global L_p estimates for kinetic Kolmogorov-Fokker-Planck equations in divergence form, with T. Yastrzhembskiy, submitted (2022).

6. Sobolev estimates for fractional parabolic equations with space-time non-local operators, with Y. Liu, submitted (2022).

7. Higher regularity for solutions to equations arising from composite materials, with L. Xu, submitted (2022).

8. Optimal estimates for transmission problems including relative conductivities with different signs, with Z. Yang, submitted (2022).

9. Global Schauder estimates for kinetic Kolmogorov-Fokker-Planck equations, with T. Yastrzhembskiy, submitted (2022).

10. Jacobian determinants for (nonlinear) gradient of planar ∞-harmonic functions and applications, with Fa Peng, Yi Ru-ya Zhang, and Yuan Zhou, submitted (2022).

HONORS AND AWARDS

Mid-career Research Achievement Award: Brown University, 2022.4.

NSF Grant: DMS-2055244 (P.I.), 2021.7–2024.6.

Simons Foundation: Mathematics and Physical Sciences-Simons Fellows in Mathematics, 818684, 2021.7–2022.6.

Simons Foundation: Mathematics and Physical Sciences-Collaboration Grants for Mathematicians, 709545, 2020.9–2025.8.

Army Research Office: GR5212030 (P.I.), Conference Proposal: "Nonlinear PDEs, Stochastic Control, and Filtering: New Methods and Applications", 2017.5–2018.5.

NSF Grant: DMS-1600593 (P.I.), 2016.7–2019.6.

NSF CAREER Award: DMS-1056737 (P.I.), 2011.7–2017.6.

NSF Grant: DMS-0800129 (P.I.), 2008.7–2012.6.

MSRI Membership: 2007.7–2007.8.

IAS Membership: 2006–2007, 2008.9–2008.12, 2021–20022.

Travel Grant from AMS for ICM 2006, Madrid, Spain: August 22–30, 2006.

Outstanding Graduate: Fudan University, 2001.

The First, Second Prizes of People's Scholarship: Fudan University, 1998–2001.

Meritorious Winner of Mathematical Contest in Modeling: The Consortium for Mathematics and its Applications, 2000.

Perfect Paper on the American Invitational Mathematics Examination: The Mathematical Association of America, 1997.

The First Prize of Chinese Mathematical Olympiad: rank no. 4 in P.R.China, 1997.

The First and Second Prizes: in contests of Mathematics, Physics and Chemistry, 1991–1997.

CONFERENCE AND WORKSHOP TALKS

- International Conference on Theory and Computation of Partial Differential Equations, Shandong University of Technology, Zibo, Shandong, China, November 26-27, 2022.

- 2022 Global Korean Mathematical Society International Virtual Conference, Seoul, South Korean, Oct. 18-21, 2022.

- Recent Progress in Kinetic and Integro-Differential Equations, Birs, Banff, Alberta, Canada, Nov. 5-10, 2022.

- Harmonic Analysis, Stochastic and PDEs, International Centre of Mathematical Sciences (ICMS), Edinburgh, UK, June 20-24, 2022.

- Harmonic Analysis and PDE in Seoul, Yonsei University, Seoul, South Korea, May 16-20, 2022.

- AMS Sectional Meeting, Special session on Elliptic and Parabolic Equations on Topics Arising from Models in Materials Science, Oct. 23, 2021.

- AMS Sectional Meeting, Special Session on Regularity Theory for Linear and Nonlinear PDEs, May 1, 2021.

- AIM workshop on Criticality and Stochasticity in Quasilinear Fluid Systems, April 6, 2021.

- AMS Spring Eastern Virtual Sectional Meeting, Special Session on Nonlinear Wave Equations, General Relativity, and Connections to Fluid Dynamics, March 20, 2021.

- The 3rd SIAM TXLA annual meeting, Texas A&M university (via Zoom), mini-symposium "Topics in qualitative and quantitative properties of partial differential equations", Oct. 16-18, 2020.

- Workshop on Harmonic Analysis and Applications, Tsinghua Sanya International Mathematics Forum, Jan. 6-10, 2020.

- SIAM Conference on Analysis of Partial Differential Equations, La Quinta, CA, Dec. 11-14, 2019.

- Launching Program of Zu Chongzhi Math Center, Kunshan, China, Oct. 31-Nov. 3, 2019.

- The 84th midwest PDE conference, Illinois Institute of Technology, Chicago, Oct. 26-27, 2019.

- Conference on recent Progress in Nonlinear Partial Differential Equations, Beijing, June 25-29, 2019.

- One Day PDE Workshop, Beijing Normal University, June 17, 2019.
- The 8th International Congress of Chinese Mathematicians, Tsinghua University, Beijing, June 13, 2019.

- AMS Sectional Meeting, University of Connecticut, April 13, 2019.

- AMS Sectional Meeting, University of Hawai'i at Mañoa, Honolulu, HI, March 23, 2019.

- Colloquium, Department of Mathematics, Louisiana State University, Oct. 25, 2018.

- AMS Sectional Meeting, Newark, DE, Sept. 29–30, 2018

- Regularity and blow-up of Navier-Stokes type PDEs using Harmonic and Stochastic Analysis, Banff International Research Station (BIRS), Aug 19–24, 2018.

- The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Taiwan, July 5–9, 2018.

- Joint AMS–CMS meeting, Fudan University, Shanghai, China, June 11–14, 2018.

- AMS Sectional Meeting, Northeastern University, Boston, MA, April 21–22, 2018.

- Conference on Analysis of Classical Incompressible Fluids, Shanghai Center for Mathematical Sciences, Fudan University, October 10, 2017.

- AMS Sectional Meeting, the University of Central Florida, Orlando, FL, September 23–24, 2017.

- The 6th BNU-PDE workshop and Minicourses (1 talk and 2 lectures), Beijing Normal University, Beijing, China, June 28–29, 2017.

- Nonlinear PDEs, Stochastic Control and Filtering: New Methods and Applications, the International Centre of Mathematical Sciences (ICMS), Edinburgh, UK, May 29–June 2, 2017.

- AMS Sectional Meeting, Hunter college, City University of New York, New York, May 6–7, 2017.

- AMS Sectional Meeting, Indiana University, Bloomington, Indiana, April 1–2, 2017.

- The fifth Bielefeld-SNU Joint Workshop in Mathematics, Bielefeld University, Bielefeld, Germany, February 22–25, 2017.

- The 7th International Congress of Chinese Mathematicians (ICCM), invited speakers, the Academy of Mathematics and Systems Science (AMSS) and the Morningside Center of Mathematics (MCM), Beijing, China, August 6–11, 2016.

- Workshop on nonlinear partial differential equations: theory and applications, Lishui Institute, Lishui, China, July 19–23, 2015.

- AMS sectional meeting, San Francisco State University, October 25–26, 2014.

- The 4th Oklahoma PDE Workshop, Oklahoma State University, October 26–27, 2013.

- Workshop on Nonlinear Analysis and Control Theory, Shanghai Jiaotong University, Shanghai, China, July 1, 2013.

- Young Mathematician Forum, Beijing International Center for Mathematical Research, June 18 – 21, 2013.

- 9th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, Orlando, Florida, July 1–5, 2012.

- 2012 Xiamen Workshop on Partial Differential Equations and Applications, Xiamen, China, June 26–July 1, 2012.

- Workshop on nonlinear elliptic and parabolic equations with non-standard diffusion and applications, University of Chicago, Chicago, May 14–18, 2012.

- AMS sectional meeting, University of South Florida, Tampa, FL, March 10–11, 2012.

- SIAM Conference on Analysis of Partial Differential Equations (2 invited talks), San Diego, CA, November 14–17, 2011.

- AMS sectional meeting, Georgia Southern University, Statesboro, GA, March 12–13, 2011.

- AMS sectional meeting, UCLA, Los Angeles, CA, October 9–10, 2010.

- AMS sectional meeting, Florida Atlantic University, Boca Raton, FL, October 30–November 1, 2009.

- AMS sectional meeting, Baylor University, Waco, TX, October 16–18, 2009

- The Twelfth Rivière-Fabes Symposium on Analysis and PDE, School of Mathematics, University of Minnesota, April 17-19, 2009. *Regularity of elliptic and parabolic equations with rough coefficients.*

- AMS/MAA Joint meeting, Washington, DC, January 8, 2008. *Rigidity of Landau's solutions to the Navier-Stokes equations.*

- 7th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, UT Arlington, Arlington, TX, May 18, 2008 to May 21, 2008. *Finite time singularities and global well-posedness for fractal Burgers equation.*

- MSRI Summer Microprogram on Nonlinear Partial Differential Equations, MSRI, Berkeley, CA, July 23, 2007 to August 10, 2007. *On the Green's matrices of strongly elliptic and parabolic systems of second order.*

- Asymptotic Analysis in Stochastic Processes, Nonparametric Estimation and Related Problems, Wayne State University, Detroit, MI, September 16, 2006. *On time inhomogeneous controlled diffusion processes in domains.*

- Probabilistic and Analytical Perspectives on Contemporary PDEs, Carnegie Mellon University, Pittsburgh PA, May 29, 2006. *About smoothness of solutions of the heat equations in closed smooth space-time domains.*

- Frontiers of Applied Analysis, Carnegie Mellon University, Pittsburgh PA, Sept. 9, 2005. *Rate of convergence of finite-difference approximations for Bellman's equations with constant coefficients.*

- International Summer School on Fully Nonlinear Partial Differential Equations and Applications, Zhejiang University, June 7, 2005. *Hessian equations with elementary symmetric functions.*

- Statistics, Numerical Analysis, II, AMS/MAA Joint meeting, Atlanta, Georgia, January 6, 2005. *Rate of convergence of finite-difference approximations for Bellman's equations with constant coefficients.*

Seminar Talks and Short Courses

- Colloquium, Department of Mathematics, University of Pittsburgh, Dec. 2, 2022.

- Short course in PDEs (4 lectures), Lanzhou University, China, October, 2022.

- Short course in PDEs (4 lectures), Beijing Normal University, China, July, 2022.
- *Analysis seminar,* IAS, April 26, 2022.

- *Nonlinear Analysis Seminar,* Rutgers University, March 30, 2022.

- *PDE Seminar,* Xi'an Jiaotong University, March 15, 2022.

- *Colloquium, UC Riverside, March 2, 2022.*

- *PDE seminar via Zoom,* AMSS, Chinese Academy of Sciences, Feb. 10, 2022.

- *PDE seminar,* John Hopkins University, Oct. 25, 2021.

- *PDE seminar,* Purdue University, Oct. 21, 2021.

- *PDE seminar,* Beijing Jiaotong University, Oct. 29, 2021.

- *PDE seminar,* Lanzhou University, July 8, 2021.

- *Joint Webminar on Material Sciences,* June 25, 2021.

- *Seminars on non-local operators, probability and singularities (via Zoom), Oct. 6, 2020.*

- *PDE seminar,* Korean Institute for Advance Study (KIAS), July 4, 2019.

- *A short course on L_p estimates for Stokes systems (three 2-hour lectures), Academy of Mathematics and Systems Science,* Chinese Academy of Sciences, June 14-24, 2019.

- *PDE seminar,* School of Mathematics, Fudan University, June 10, 2019.

- *PDE seminar,* Department of Mathematics, Georgia Institute of Technology, Feb. 25, 2019.
- *PDE seminar,* School of Mathematics, Beijing Normal University, Jan. 18, 2019.
- *PDE seminar,* Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Jan. 11, 2019.
- *PDE Seminar,* Beijing Jiaotong University, Jan. 10, 2019.
- *Colloquium,* Department of Mathematics, Old Dominion University, Nov. 8, 2018.
- *Analysis Seminar,* Universite Laval, November 16, 2018
- *Colloquium,* Department of Mathematics, Old Dominion University, November 8, 2018.
- *Colloquium,* Department of Mathematics, Louisiana State University, October 25th, 2018.
- *PDE Seminar,* Korea University, June 29, 2018.
- *PDE Seminar,* University of Connecticut, April 2, 2018.
- *PDE Seminar,* Academy of Mathematics and Systems Science, Chinese Academy of Sciences, June 22, 2018.
- *PDE seminar,* Beijing Normal University, June 21, 2018.
- *PDE seminar,* University of Minnesota, March 28, 2018.
- *PDE seminar,* University of Illinois at Chicago, Feb. 19, 2018.
- *PDE seminar,* University of Tennessee, November 16, 2017.
- *Analysis Seminar,* University of Rochester, Friday, November 9th, 2017.
- *Seminar on PDE (3 talks),* Hong Kong University of Science and Technology, August, 2017.
- *PDE seminar,* City University of Hong Kong, August 1, 2017.
- *PDE seminar,* Academy of Mathematics and Systems Science, Chinese Academy of Sciences, July 10, 2017.
- *PDE seminar,* Beijing Institute of Technology, July 7, 2017.
- *Department Colloquium,* Iowa State University, Dec. 6, 2016.
- the Hong Kong University of science and technology, Nov. 17, 2016.
- the Chinese University of Hong Kong, Nov. 14, 2016.
- *Analysis seminar,* the City University of Hong Kong, Nov. 7, 2016.
- *Geometry and Analysis seminar,* Rice University, Oct. 19, 2016.
- *School of Mathematics,* Beijing Normal University, Aug. 6, 2016.
- *School of Mathematical Sciences,* Fudan University, Aug. 2, 2016.
- *Analysis and PDE seminar,* Johns Hopkins University, Nov. 9, 2015.
- *PDE seminar,* University of Pittsburgh, Oct. 26, 2015.
- *PDE seminar,* Oklahoma State University, Oct. 22, 2015.

- *School of Mathematical Sciences,* Fudan University, Aug. 25, 2015.

- Academy of Mathematics and Systems Science, Chinese Academy of Sciences, Aug. 21, 2015.

- School of Mathematics, Beijing Normal University, Aug. 19, 2015.

- *A short course on some nonstandard elliptic and parabolic estimates (four 2-hour lectures), Academy of Mathematics and Systems Science,* Chinese Academy of Sciences, Aug. 5–Aug. 14, 2015.

- *Boston University/Brown Joint Dynamics and PDE Seminar,* Nov. 12, 2014.

- *Nonlinear Analysis and PDEs Seminar,* Rutgers University, October 14, 2014.

- *CAMP/Nonlinear PDE seminar,* University of Chicago, May 21, 2014.

- *Analysis of Fluids and Related Topics Seminar,* Princeton University, April 24, 2014.

- *PDE & Geometric Analysis seminar,* University of Wisconsin, March 3, 2014.

- *Colloquium, Academy of Mathematics and Systems Science,* Chinese Academy of Sciences, June 7, 2013.

- *A short course on L_p estimates for parablic equations (four 2-hour lectures), Academy of Mathematics and Systems Science,* Chinese Academy of Sciences, May 28–June 6, 2013.

- *Analysis seminar,* Beijing Jiatong University, June 3, 2013.

- *Analysis seminar,* Beijing Normal University, May 31, 2013.

- *Academy of Mathematics and Systems Science, the Morningside center,* Chinese Academy of Sciences, 4 lectures, May 26–June 6, 2013.

- *Department colloquium,* Temple University, May 6, 2013.

- *DG-MP-PDE seminar,* University of British Columbia, March 13, 2012.

- *School of Mathematical Sciences,* Fudan University, January 9, 2012.

- *Analysis seminar,* Northwestern University, April 23, 2011.

- *Nonlinear PDE seminar,* UC Irvine, March 21, 2011.

- *Analysis seminar,* University of Pennsylvania, October 26, 2010.

- *PDE seminar,* University of Minnesota, March 4, 2010.

- *PDE seminar,* Ohio State University, January 20, 2010.

- *PDE seminar,* University of Connecticut, November 2, 2009.

- *Geometry and Analysis seminar,* Columbia University, October 8, 2009.

- *School of Mathematical Sciences,* Fudan University, June 10, 2009.

- *Boston University/Brown University PDE Seminar,* May 1, 2009.

- *Guest lecture in Geometric PDE,* IAS, November 26, 2008.

- *Nonlinear Analysis and PDEs Seminar,* Rutgers University, November 19, 2008.

- *Talks by Members,* Institute for Advanced Study, September 24, 2008.

- *Analysis/PDE Seminar,* MIT, September 10, 2008.

- *Analysis Seminar,* University of Texas at Austin, March 26, 2008.
- *PDE Seminar,* Brown University, October 12, 2007.
- *Ergodic Theory and Statistical Mechanics Seminar,* Princeton University, March 8, 2007.
- *Mathematical physics seminar,* IAS, February 21, 2007.
- *Nonlinear Analysis and PDEs Seminar,* Rutgers University, February 13, 2007.
- *School of Mathematical Sciences,* Fudan University, January 8, 2007.
- *PDE/Applied Math Seminar,* University of Maryland, December 14, 2006.
- *Special Talk – Stochastic Systems Seminar,* Brown University, December 5, 2006.
- *PDE Seminar,* Brown University, December 1, 2006.
- *Analysis Seminar,* Princeton University, November 27, 2006.
- *PDE Seminar,* University of Minnesota, November 8, 2006.
- *Talks by Postdoctoral Members,* Institute for Advanced Study, October 11, 2006.
- *PDE Seminar,* Northwestern University, Evanston IL, May 11, 2006.
- *Calderón-Zygmund Analysis Seminar,* University of Chicago, Chicago IL, May 1, 2006.
- *Calderón-Zygmund Analysis Seminar,* University of Chicago, Chicago IL, Oct. 24, 2005.
- *Applied Mathematics and Numerical Analysis Seminar,* University of Minnesota, February 24, 2005.
- *PDE Seminar,* University of Minnesota, November 6, 2004.

Editorial work

- ◇ SIAM J. Math. Anal., Associate Editor.
- ◇ J. Differential Equations, Associate Editor.
- ◇ Communications on Pure and Applied Analysis, Associate Editor.
- ◇ Electronic Journal of Differential Equations, Associate Editor.
- ◇ Communications in Mathematical Research, Associate Editor.
- ◇ Annals of Applied Mathematics, Associate Editor.

Other Professional Activities

NSF Panelist: 2012, 2013, 2017.

Ph.D. Thesis Advisor of: Hong Zhang (May 2017), Kunrui Wang (July 2019), Zongyuan Li (April 2020), Yanze Liu (current), Hanye Zhu (current).
Visiting students: Xumin Gu (2012-2013), Chiara Gallarati (2015-2016), Longjuan Xu (2017-2019), Xiufang Cui (2018-2019).

Postdoc mentor of: Jongkeun Choi (2018-2019), Timur Yastrzhembskiy (2020-current), Zhuolun Yang (2021-current).

Committee Member of Ph.D. Thesis Defence for: Yi Cai (2012), Lei Wu (2015), Weifeng Sun (2019).

Committee Member of Preliminary Exam of: Zhen Chen, Yang Yang (2010), Hong
Zhang (2012), Carey Caginalp (2012, 2013), Tong Qin (2014), Cengke Shi, Sameer
Iyer, Ian Alevy, Tianheng Chen, Zheng Sun, Kunrui Wang, Taehee Lee (2015),
Will Pazner, Victor Suriel, Rose Parker (2016), Zongyuan Li, Junhwa Jung (2017),
Tingwei Meng, Charles Parker, Xinyue Yu (2018), Patrick Flynn, Mengjie Liu, Zsolt
Veraszto, Zhen Zhang (2019), Sining Gong, Yanze Liu, Paula Chen, Xiaoyu Xie,
Hanye Zhu, Ziyao Xu (2020), Kevin Hu, Tianmin Yu (2021).

Director of Undergraduate Studies at Division of Applied Mathematics: 2014–
2017.

Member of Undergraduate Program Advisors: 2009/10, 2011/2012, 2013 (spring),
2014–2017, 2018-2019, 2020-2021, 2022-2023.

Member of Graduate Program Advisors: 2013/2014, 2017/2018, 2019/2020.

Organizer of conferences: Special session "Special Session on Nonlinear Partial Dif-
ferential Equations" in 2011 Spring Central AMS Section Meeting.
A workshop on deterministic and stochastic partial differential equations on Novem-
ber 6-8, 2015.
Special session "Partial differential equations from fluid dynamics" in the 11th AIMS
meeting on July 1–5, 2016.
Special session "Mathematical analysis and nonlinear partial differential equations"
at the Joint Mathematics Meetings in San Diego, CA, January 10–13, 2018.
Special session at the joint AMS–CMS meeting, Fudan University, Shanghai, China,
June 11–14, 2018.

Organizer of PDE Seminar: 2008/09, 2009/10, 2012, 2013 (spring), 2018/2019, 2020/2021.

Member of Professional Organizations: American Mathematical Society (AMS),
Society for Industrial and Applied Mathematics (SIAM).