

Mark Allen

Brigham Young University
Department of Mathematics
275 TMCB
Provo, UT 84602

Phone: (801) 422-6888
Fax: (801) 422-0504
Email: allen@mathematics.byu.edu
Homepage: <https://sites.google.com/site/mkallen2/>

Employment

Assistant Professor at Brigham Young University, 2016–present.

NSF Postdoc at the University of Texas at Austin, 2013–2016.

Education

Ph.D. Mathematics, Purdue University, 2013. PhD Advisor: Arshak Petrosyan

M.A. Mathematics, Purdue University, 2009.

B.S. Mathematics, Brigham Young University, 2007.

Publications

Rectifiability and uniqueness of blow-ups for points with positive Alt-Caffarelli-Friedman limit, with D. Kriventsov and R. Neumayer, submitted [arXiv:2210.03552].

Sharp quantitative Faber-Krahn inequalities and the Alt-Caffarelli-Friedman monotonicity formula, with D. Kriventsov and R. Neumayer, submitted [arXiv:2107.03505].

Linear Stability Implies Nonlinear Stability for Faber-Krahn Type Inequalities, with D. Kriventsov and R. Neumayer, accepted in *Interfaces Free Bound.* [arXiv:2107.03495].

The Inhomogeneous Boundary Harnack Principle for Fully Nonlinear and p-Laplace equations, accepted in *Annales De l'IHP (C)-ANL*, [arxiv:2010.11854].

Minimizers of a free boundary problem on three-dimensional cones, with B. Barker, J. Gardiner, and M. Zhao, *Nonlinear Anal.* 226 (2023).

A new boundary Harnack principle (equations with right hand side), with H. Shahgholian, *Arch. Ration. Mech. Anal.* 234 (2019), no. 3, 1413-1444.

The fractional unstable obstacle problem, with M. Smit Vega Garcia, *Nonlinear Anal.* 193 (2020), 111459, 19pp.

A spiral interface with positive Alt-Caffarelli-Friedman limit at the origin, with D. Kriventsov, *Analysis & PDE* Vol 13 (2020), No. 1, 201-214.

Uniqueness for weak solutions of parabolic equations with a fractional time derivative, *Contemp. Math.*, 723,

A fractional free boundary problem related to a plasma problem, *Communications in Analysis and Geometry* Vol 27, no. 8.

Hölder regularity for nondivergence nonlocal parabolic equations, *Calc. Var. Partial Differential Equations* 57 (2018), no. 4.

A nondivergence parabolic problem with a fractional time derivative, *Differential and Integral Equations* 31 (2018), no. 3-4, 215-230.

A free boundary problem on three-dimensional cones, *J. Differential Equations* 263 (2017), no. 12, 8481-8507.

Porous medium flow with both a fractional potential pressure and fractional time derivative, with L. Caffarelli and A. Vasseur, *Chin. Ann. Math. Ser. B* 38 (2017), no. 1, 45-82.

The Two-phase parabolic signorini problem, with Wenhui Shi, *Indiana Univ. Math. J.* 65 (2016), no. 2, 727-741.

A parabolic problem with a fractional-time derivative, with L. Caffarelli and A. Vasseur, *Arch. Ration. Mech. Anal.* 221 (2016), no. 2, 603-630.

The two-phase fractional obstacle problem, with E. Lindgren and A. Petrosyan, *SIAM J. Math. Anal.* 47 (2015), no. 3, 1879-1905.

Free boundaries on two dimensional cones, with H. Chang Lara, *J. Geom. Anal.* 25 (2015), no. 3, 1547-1575.

Separation of a lower-dimensional free boundary in a two phase problem, *Math. Res. Lett.* 19 (2012), no.5, 1055-1074.

A two-phase problem with a lower-dimensional free boundary, with A. Petrosyan, *Interfaces Free Bound.* 14 (2012), no. 3, 307-342.

Teaching Experience

Measure Theory, 2 semesters.

Partial Differential Equations, 4 semesters.

Linear Analysis, 3 semesters.

Nonlinear Analysis, 2 semesters.

Real Analysis, 3 semesters.

Ordinary Differential Equations, 6 semesters.

Third semester calculus, 1 semester.

Second semester calculus, 4 semesters.

First semester calculus, 4 semesters.

Mathematics and Geometry for elementary education majors, 1 semester.

College Algebra, 1 semester.

Honors and Awards

BYU math department Distinguished Research Award
Simons Foundation Collaboration Grant recipient
NSF postdoc recipient.
Research support award from Purdue Research Foundation.

Events Organized

Co-organized special session at online AMS western sectional, Oct 2020.
Co-organized special session at AMS sectional at University of Florida at Gainesville, Nov 2019.
Co-organized special session at AMS sectional at University of Hawaii at Manoa, Mar 2019.
Co-organized special session at AMS sectional at Portland State University, Apr 2018.
Co-organized Rocky Mountain PDE conference, May 2017.
Co-organized with F. Maggi a minisymposium at SIAM Conference on Analysis of Partial Differential Equations, Dec 2015.

Recent Talks and Presentations given

Analysis Seminar at University of Sussex, Brighton England, Nov 2022
Colloquium at Linkoping University, Linkoping Sweden, Nov 2022
Mittag-Leffler Institute, Stockholm Sweden, Sep 2022
Applied Math Seminar at University of Utah, Apr 2022
AMS Spring sectional meeting (virtual), Mar 2022
Geometry and Analysis seminar at Columbia University (virtual), Nov 2021
AMS Fall central sectional meeting (virtual), Oct 2021
AIMS-Cameroon Research Center Colloquium (virtual), Sep 2021
Free Boundary Problems: Theory and Applications (virtual), Sep 2021
Barrett Memorial Lectures (virtual), May 2021
Rio de Janeiro Webinar on Analysis and PDEs, Sep 2020
Colloquium at Oregon State University, Feb 2020
Analysis seminar at Oregon State University, Feb 2020
12th Americas Conference on Differential Equations and Nonlinear Analysis, CIMAT Mexico, Dec 2019
AMS sectional meeting at UC Riverside, Nov 2019

Analysis Seminar at Northwestern University, Sep 2019

AMS sectional meeting at Madison, Wisconsin, Sep 2019

Swedish Summer PDEs at KTH in Stockholm, Aug 2019

Analysis Seminar at Rutgers University, Feb 2019