

# Davit(David) Harutyunyan

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## Employment

- 2021–** Associate Professor, Math. Department, University of California Santa Barbara.  
Email: harutyunyan@ucsb.edu  
Office: South Hall 6515
- 2017-2021 Assistant Professor, University of California Santa Barbara.  
2016-2017 Postdoctoral Associate, EPFL, Lausanne, Switzerland.  
2013-2016 Research Assistant Professor, University of Utah.  
2011-2013 Postdoctoral Research Assistant Professor, Temple University.

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## Education

- June 2012 **Ph.D.** Hausdorff Center for Mathematics, University of Bonn, Germany  
**Supervisor: Prof. Stefan Müller**
- 2005-2006 **M.S.**, University of Fribourg, Faculty of Mathematics, Fribourg, Switzerland  
2006 **M.S.**, Yerevan State University, Faculty of Mathematics, Yerevan, Armenia  
2004 **B.S.**, Yerevan State University, Faculty of Mathematics, Yerevan, Armenia

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## Research Interests

Applied Analysis and Applied Mathematics broadly speaking

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## Selected Awards and Honors

- 2018 **Emil Artin Junior Prize in Mathematics** (citation appeared in the Notices of the American Mathematical Society)
- 2016 **Outstanding Postdoc Award**, University of Utah
- 2007–2009 **MULTIMAT Fellowship**, Max-Planck Institute for Mathematics, Leipzig, Germany
- 2005 **Best Student of Yerevan State University Award**, Yerevan State University
- 2005 **Gold Medal** at the 10th International Scientific Mathematical Olympiad
- 2000 **Republic of Armenia Government House Medal**
- 2000 **Silver Medal** at the 41st International Mathematical Olympiad
- 1999 **Bronze Medal** at the 40th International Mathematical Olympiad
- 1998 **Bronze Medal** at the 39th International Mathematical Olympiad
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## Grants

2022-2025	NSF Individual grant, DMS-2206239 (\$210k), PI
2018-2022	NSF Individual grant, DMS-1814361 (\$154k), PI
2018	Regent's Junior Faculty Fellowship, University of California Santa Barbara (\$7.5k)

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## Publications and Preprints

34. **D. Harutyunyan**. On the  $L^2$  to  $L^p$  passage in sharp Geometric Rigidity Estimates and Korn inequalities in thin domains, *In preparation*.
33. **D. Harutyunyan**, T. Mengesha, H. Mikayelyan, and J.M. Scott. Fractional Korn's inequalities without boundary conditions, *preprint*.
32. **D. Harutyunyan** and H. Mikayelyan. On the fractional Korn inequality in bounded domains: Counterexamples to the case  $ps < 1$ . *Advances in Nonlinear Analysis*, accepted.  
<https://arxiv.org/abs/2204.00999>
31. **D. Harutyunyan** and A. Martins Rodrigues. The buckling load of cylindrical shells under axial compression depends on the cross-section curvature. *Journal of Nonlinear Science*, **33**, Article number: 27 (2023).
30. **D. Harutyunyan**. A hint on the localization of the buckling deformation at vanishing curvature points on thin elliptic shells. *Journal of Elasticity*, **152**, pp. 61–77 (2022).
29. **D. Harutyunyan** and N. Hovsepyan. On the extreme rays of the cone of 3 times 3 quasiconvex quadratic forms: Extremal determinants vs extremal and polyconvex forms. *Arch. Ration. Mech. Anal.*, **244**, pp. 1–25 (2022).
28. Zh. Avetisyan, **D. Harutyunyan**, and N. Hovsepyan. Rigidity of a thin domain depends on the curvature, width, and boundary conditions. *Appl. Math. Optim.*, 84, pp. 3229–3254 (2021).
27. **D. Harutyunyan**. On the geometric rigidity interpolation estimate in thin bi-Lipschitz domains. *C. R. Acad. Sci. Paris, Ser. I*, Vol. 358 (2020) no. 7, pp. 811–816.
26. **D. Harutyunyan**. The Sharp  $L^p$  Korn interpolation and second inequalities in thin domains, *SIAM J. Math. Anal.*, 52(6), pp. 5775–5791, 2020.
25. **D. Harutyunyan**. The asymptotically sharp geometric rigidity interpolation estimate in thin bi-Lipschitz domains. *Journal of Elasticity*, 141, pp. 291–300 (2020).
24. **D. Harutyunyan** and H. Mikayelyan. On the  $L^\infty$ -maximization of the solution of Poisson's equation: Brezis-Galouet-Wainger type inequalities and applications. *Proceedings of the Royal Society Edinburgh A*, Published online by Cambridge University Press: 20 February 2020  
DOI: <https://doi.org/10.1017/prm.2020>.
23. **D. Harutyunyan**. A note on the extreme points of the cone of quasiconvex quadratic forms with orthotropic symmetry. *Journal of Elasticity*, 09 January, 2020, pp. 1–15.
22. **D. Harutyunyan** and H. Mikayelyan. Weighted asymptotic Korn and interpolation Korn inequalities with singular weights. *Proceedings of the AMS*, 147 (2019), 3635–3647.
21. **D. Harutyunyan**. On the Korn interpolation and second inequalities in thin domains, *SIAM J. Math. Anal.*, 50(5), 4964–4982, 2018.

20. **D. Harutyunyan.** The asymptotically sharp Korn interpolation and second inequalities for shells. *C. R. Acad. Sci. Paris, Ser. I.*, Vol. 356, Iss. 5, May 2018, pp. 575–580.
19. **D. Harutyunyan.** When the Cauchy inequality becomes a formula, *Amer. Math. Month.* 125:9, pp. 835–838, 2018.
18. **D. Harutyunyan.** Gaussian curvature as an identifier of shell rigidity. *Arch. Ration. Mech. Anal.*, Vol. 226, Iss. 2, pp. 743–766, 2017.
17. G.W. Milton, **D. Harutyunyan**, and M. Briane. Towards a complete characterization of effective elasticity tensors of mixtures of an elastic phase and an almost rigid phase, *Math. Mech. Compl. Syst.*, 5(1), 95–113, 2017.
16. G.W. Milton, M. Briane and **D. Harutyunyan.** On the possible effective elasticity tensors of 2-dimensional and 3-dimensional printed materials. *Math. Mech. Compl. Syst.*, Vol. 5, No. 1, 41–94, 2017.
15. **D. Harutyunyan.** Quantitative anisotropic isoperimetric and Brunn-Minkowski inequalities for convex sets with improved defect estimates. *ESAIM: COCV*, 24(2), (2018) pp. 479–494.
14. Y. Grabovsky and **D. Harutyunyan.** Korn inequalities for shells with zero Gaussian curvature. *Annal. d’Inst. Henry Poincaré (C) Anal. Non Lin.*, Vol. 35, Iss. 1 (2018), pp. 267–282.
13. **D. Harutyunyan.** Sharp weighted Korn and Korn-like inequalities and an application to washers. *J. Elasticity*, Vol. 127, Iss. 1, pp 59–77, 2017.
12. **D. Harutyunyan**, G.W. Milton and R.V. Craster. High Frequency Homogenization for traveling waves in periodic media. *Proc. Roy. Soc. London, A.* Published 13 July 2016. DOI: 10.1098/rspa.2016.0066
11. **D. Harutyunyan** and G.W. Milton. Towards characterization of all  $3 \times 3$  extremal quasiconvex quadratic forms. *Comm. Pure Appl. Math.*, Vol. 70, Iss. 11, pp. 2164–2190, 2017.
10. **D. Harutyunyan**, G.W. Milton, J. Boyer and T. Dick. On ideal dynamic climbing ropes. *Proc. Inst. Mech. Engin. P: J. Sports Engin. Tech.* 2016, DOI: 10.1177/1754337116653539
9. **D. Harutyunyan** and G.W. Milton. On the relation between extremal elasticity tensors with orthotropic symmetry and extremal polynomials. *Arch. Ration. Mech. Anal.*, Vol. 223, Iss. 1, pp 199–212, 2017.
8. Y. Grabovsky and **D. Harutyunyan.** Scaling instability in the buckling of axially compressed cylindrical shells. *J. Nonl. Sci.*, Vol. 26, Iss. 1, pp. 83–119, Feb. 2016.
7. **D. Harutyunyan.** On the existence and stability of minimizers in ferromagnetic nanowires. *J. Math. Anal. Appl.*, Vol. 434, Iss. 2, pp. 1719–1739. 15 Feb. 2016.
6. Y. Grabovsky and **D. Harutyunyan.** Rigorous derivation of the formula for the buckling load in axially compressed circular cylindrical shells. *J. Elasticity*, 120(2), pp. 249–276, 2015.
5. **D. Harutyunyan** and G.W. Milton. Explicit examples of extremal quasiconvex quadratic forms that are not polyconvex. *Calc. Var. PDE*, October 2015, Volume 54, Issue 2, pp 1575–1589.
4. **D. Harutyunyan.** New asymptotically sharp Korn and Korn-like inequalities in thin domains. *J. Elasticity*, 117(1), pp. 95–109, 2014.
3. Y. Grabovsky and **D. Harutyunyan.** Exact scaling exponents in Korn and Korn-type inequalities for cylindrical shells. *SIAM J. Math. Anal.*, 46(5), pp. 3277–3295, 2014.
2. **D. Harutyunyan.** Scaling laws and the rate of convergence in thin magnetic films. *J. Math. Anal. Appl.*, 420(2), pp. 1744–1761, 2014.

1. **D. Harutyunyan.** On the number of arrangements of  $n$ -ary brackets. *Lomonosov 2002 proceedings*, 2002.
- **D. Harutyunyan.** On the G-convergence of the energies and the convergence of almost minimizers in infinite magnetic cylinders. Dissertation, *published online in 2012 in Universitäts und Landesbibliothek Bonn*, <http://hss.ulb.uni-bonn.de/2012/2886/2886.htm>

## Refereeing Service

2014– Reviewer for the journals:

Annales d'Institut Henri Poincaré (C), Nonlinear Analysis, Annali di Matematica Pura ed Applicata, Archive for Rational Mechanics and Analysis, ESAIM: Control, Optimization, and Calculus of Variations, Journal of Elasticity, Journal of Mathematical Analysis and Applications, Journal of Optimization Theory and Applications, Mathematical and Computational Applications, Mathematical Methods in the Applied Sciences, Mathematical Reviews, Meccanica, Nonlinearity, Proceedings of the Royal Society Edinburgh A, Results in Mathematics, Research in the Mathematical Sciences, SIAM Journal of Applied Mathematics, SIAM Journal on Mathematical Analysis, Studies in Applied Mathematics, Vietnam Journal of Mathematics

## Teaching

Winter of 2023	Real Analysis II ( <i>Graduate course</i> , Math 201B), UCSB
Fall of 2022	Introduction to Composite Materials ( <i>Special Topic Course</i> , Math 260L), UCSB
Summer of 2022	Introduction to Complex Variables I (Math 122A, 2 sections), UCSB
Spring of 2022	The Calculus of Variations ( <i>Special Topic Course</i> , Math 260L), UCSB
Winter of 2022	Real Analysis I ( <i>Graduate course</i> , Math 201B), UCSB
Fall of 2021	Real Analysis I ( <i>Graduate course</i> , Math 201A), UCSB
Fall of 2021	Transition to Higher Mathematics (Math 8), UCSB
Summer of 2021	Introduction to Complex Variables I (Math 122A, 2 sections), UCSB
Winter of 2021	Real Analysis II ( <i>Graduate course</i> , Math 201B), UCSB
Winter of 2021	Introduction to Complex Variables II (Math 122B), CCS
Fall of 2020	Introduction to Complex Variables I (Math 122A), CCS
Summer of 2020	Advanced Linear Algebra (Math 108B), UCSB
Spring of 2020	Introduction to Convex Optimization (Math 120), CCS
Winter of 2020	Transition to Higher Mathematics (Math 8), UCSB
Winter of 2020	Real Analysis ( <i>Graduate course</i> , Math 201B), UCSB
Fall of 2019	Real Analysis ( <i>Graduate course</i> , Math 201A), UCSB
Summer of 2019	Methods of Analysis (Math 117), UCSB
Winter of 2019	Partial Differential Equations ( <i>Graduate course</i> , Math 246B), UCSB
Winter of 2019	The Calculus of Variations ( <i>Special Topic Course</i> , Math 260AA), UCSB
Fall of 2018	Partial Differential Equations ( <i>Graduate course</i> , Math 246A), UCSB
Spring of 2018	Combinatorial Analysis (Math 116), UCSB
Winter of 2018	A Transition to Higher Mathematics (Math 8), UCSB
Winter of 2018	Advanced Linear Algebra (Math 108b), UCSB
Spring of 2017	Parabolic and Hyperbolic Linear PDEs (problem session), EPFL
Fall of 2016	Elliptic Linear PDEs (problem session), EPFL
Fall of 2015	Intro. to ODEs and Dyn. Sys. ( <i>Graduate course</i> , Math 5410/6840), Univ. of Utah
Fall of 2015	Accelerated Engineering Calculus II (Math 1321), University of Utah
Summer of 2015	Foundations of Analysis I (Math 3210), University of Utah
Summer of 2014	Foundations of Analysis II (Math 3220), University of Utah
Spring of 2014	Foundations of Analysis I (Math 3210), University of Utah
Spring of 2013	Linear Algebra (Math 2101), Temple University
Fall of 2012	Linear Algebra (Math 2101), Temple University

Spring of 2012  
Fall of 2011

Calculus II (Math 1042), Temple University  
Calculus I (Math 1041), Temple University

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