Alexei Kolesnikov

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Employment

August 2018 – present: Professor; Towson University

August 2013 – July 2018: Associate Professor; Towson University

August 2013 – June 2014: Shelly Visiting Associate Professor; Carnegie Mellon University

August 2007 – July 2013: Tenure-track Assistant Professor; Towson University

September 2004 – August 2007: Postdoctoral Assistant Professor; University of Michigan

Education

Ph.D. in Mathematics, May 2004. Carnegie Mellon University; Pittsburgh, PA
Thesis: "Generalized amalgamation in simple theories and characterization of dependence relations in non-elementary classes." Advisor: Professor Rami Grossberg

M.S. in Mathematics, June 1997. Novosibirsk State University; Novosibirsk, Russia
Thesis: "Analytic representation of conditional mathematical expectations."
Advisor: Professor Alexander Gutman

B.S. in Mathematics, June 1995. Novosibirsk State University; Novosibirsk, Russia
Thesis: "Boolean-valued analysis of conditional sublinear expectations."
Advisor: Professor Alexander Gutman

Research

Interests

Mathematical logic. Model theory for first order logic and non-elementary classes and its applications; foundations of mathematics.

AMS classification codes: 03C45 Classification theory; 03C75 Other infinitary logic; 03C98 Applications of model theory.

Refereed publications

1. Homology of types in stable theories and the Hurewitz correspondence. With J. Goodrick and B. Kim. *Annals of Pure and Applied Logic*, **168**, (2017), 1710–1728.
2. Interpolation properties of C^1 quadratic splines on hexagonal cells. With undergraduate students L. Allen, K. Borst, B. Claiborne, K. Pilewski. *Computer Aided Geometric Design*, **45**, (2016), 73–82.

3. Canonical forking in AECs. With W. Boney, R. Grossberg, S. Vasey. *Annals of Pure and Applied Logic*, **167**, (2016), 590–613.
4. The Hanf number for amalgamation of coloring classes. With C. Lambie-Hanson. *Journal of Symbolic Logic*, **81**, (2016), 570–583.
5. Type-amalgamation properties and polygroupoids in stable theories. With J. Goodrick and B. Kim. *Journal of Mathematical Logic*, **15**, (2015), 45pp.
6. Characterization of the second homology group of a stationary type in a stable theory. With J. Goodrick and B. Kim. *Proceedings of Asian Logic Colloquium, 2013*, World Scientific, (2015), 93–104.
7. Multivariate C^1-continuous splines on the Alfeld split of a simplex. With T. Sorokina. Proceedings of Approximation Theory XIV: San Antonio 2013. *Springer Proceedings in Mathematics & Statistics* **83**, (2014), 283–294.
8. Homology groups of types in model theory and the computation of $H_2(p)$. With J. Goodrick and B. Kim. *Journal of Symbolic Logic*, **78**, (2013), 1086–1114.
9. Estimation of the commodity flow of chlorine from storage data. With D. Howell, A. Kumchev, P. O'Neill, and M. Tiger. *Journal of Transportation Security*, **5**, (2012), 51–68.
10. Amalgamation functors and boundary properties in simple theories. With J. Goodrick and B. Kim. *Israel Journal of Mathematics*, **193**, (2013), 169–207.
11. Groupoids, covers, and 3-uniqueness in stable theories. With J. Goodrick. *Journal of Symbolic Logic*, **75**, (2010), 905–929.
12. The amalgamation spectrum. With J. Baldwin and S. Shelah. *Journal of Symbolic Logic*, **74**, (2009), 914–928.
13. Generalized amalgamation and n-simplicity. With B. Kim and A. Tsuboi. *Annals of Pure and Applied Logic*, **155**, (2008), 97–114.
14. Categoricity, amalgamation, and tameness. With J. Baldwin. *Israel Journal of Mathematics*, **170**, (2009), 411–443.
15. Morley rank in homogeneous models. With G.V.N.G. Krishnamurthi. *Notre Dame Journal of Formal Logic*, **46**, (2006), 319–329.
16. n-simple theories. *Annals of Pure and Applied Logic*, **131**, (2005), 227–261.
17. Dependence relations in non-elementary classes. *Contemp. Math., AMS*, **380**, (2005), 203–230.
18. The equality $S1 = D = R$. With R. Grossberg, I. Tomasic, and M. VanDieren. *Mathematical Logic Quarterly*, **49**, (2003), 115–128.

Other publications

1. Amalgamation functors and homology groups in model theory. With J. Goodrick and B. Kim. Proceedings of the 2014 International Congress of Mathematicians, **2**, (2014), 41–58.
2. Risk Analysis: Toxic Materials Transportation Security. White paper joint with A. Kumchev, D. Howell, P. O'Neill, and M. Tiger. *Journal of Homeland Security*.
3. Bridging Theater and Mathematics: a Mathematician's View. A refereed proceedings paper for Bridges 2011 conference.

Recent Presentations

- April 2017. Seminar talk: "Amalgamation of systems of types indexed by posets in simple theories." Yonsei University Logic Seminar.
- April 2017. Seminar talk: "Homology groups for types in stable theories." Rutgers University Logic Seminar.
- November 2016. Seminar talk: "n-simple theories." University of Maryland Logic Seminar.
- October 2016. Conference talk: "Polygroupoids and homology groups: the search for natural examples." Northeast Regional Model Theory Day, University of Pennsylvania.
- June 2016. Invited conference talk: "Hurewitz correspondence revisited." International Model Theory Conference, University of Notre Dame.
- October 2015. Seminar talk: "The Hanf number for amalgamation." CUNY Logic Workshop.
- April 2015. Workshop presentation: "Interpolation properties of C^1 quadratic splines on hexagonal cells." Oberwolfach conference on Multivariate splines and algebraic geometry; Oberwolfach, Germany.
- March 2015. Seminar talk: "Homology groups in model theory." University of Pennsylvania Logic Seminar.
- February and May 2015. Seminar talks: "Polygroupoids 2.0." University of Maryland Logic Seminar.
- January 2015. Invited talk: "Homology groups in model theory". Asian Logic Colloquium, IIT-Bombay, Mumbai, India.
- September and October 2014. Seminar talks: "The Hanf number for amalgamation." University of Maryland Logic Seminar.
- August 2014. Invited talk: "The Hanf number for amalgamation in coloring classes." Workshop on Classification Theory, a satellite meeting for the 2014 International Congress of Mathematicians. Daejeon, South Korea.
- May 2014. Invited plenary talk: "Amalgamation properties." Annual Meeting of the Association for Symbolic Logic at the University of Colorado, Boulder.
- April 2014. Seminar talk: "Hanf number for amalgamation and disjoint amalgamation." Carnegie Mellon University Model Theory Seminar.
- October 2013. Seminar talks: "Generalized Martin's axiom and disjoint amalgamation", Parts I–IV. Carnegie Mellon University Logic Seminar.
- September 2013. Seminar talks: "Generalized amalgamation and homology groups in model theory," Parts I and II. Carnegie Mellon University Model Theory Seminar.
- April 2013. Seminar talk: "Algebraic methods for multivariate splines," Part II. University of Maryland Logic Seminar.
- April 2013. Conference talk: "Reduced Spline Base Method for Computing Dimension of Multivariate Spline Spaces." The 14th International Conference on Approximation Theory, San Antonio, TX.
- February 2013. Seminar talks: "Polygroupoids and type-amalgamation properties," Parts I and II. University of Maryland Logic Seminar.

- December 2012. Seminar talk: "Generalized amalgamation, homology groups, and polygroupoids in model theory." CUNY Model Theory Seminar.
- October 2012. Seminar talks: "Polyadic groups," Parts I and II. University of Maryland Logic Seminar.
- May 2012. Seminar talk: "Saturated pairs spectrum". University of Maryland Logic Seminar.
- April 2012. Invited talk: "Homology groups in model theory". Annual Meeting of the Association for Symbolic Logic at University of Wisconsin, Madison.
- March 2012. Invited talk: "Amalgamation functors and homology groups in model theory". AMS Sectional Meeting in Manoa, HI.

Awards and Fellowships

- 2016 Excellence in Teaching Award, Fisher College of Science and Mathematics
- 2015 Grant from RTR Technologies. "Automated baselining."
- 2011, 2012, 2013, and 2014 Grants from MAA to conduct the Undergraduate Mathematics Research Conference at Towson University
- 2010-2011 Grant from Chemical Security Analysis Center. "Risk Analysis: Toxic Materials Transportation Security"
- 2009-2012 NSF grant award DMS-0901315 "Research in Model Theory: Generalized Amalgamation Properties"
- 2005 Research Fellowship from Horace H. Rackham School of Graduate Studies
- 2001 Carnegie Mellon Graduate Student University-wide Teaching Award

Professional Service

- Organizer for the Undergraduate Mathematics Research Conference at Towson University
- Reviewer for the NSF grant proposals
- Member of the Organizing Committee and Program Committee for the 2010 Annual Association for Symbolic Logic Meeting
- Book reviewer for AMS University Lecture Series
- Referee for Annals of Pure and Applied Logic, Archives of Mathematical Logic, Journal of Symbolic Logic, Notre Dame Journal of Formal Logic
- Instructor for the Michigan Math and Science Scholar program
- Member of Ph.D. dissertation committee for Bart Kastermans, University of Michigan

Teaching Experience

Undergraduate research projects

Mentored the following projects of undergraduate students:

- Applied Mathematics Laboratory project "Automated baselining." Presented to the sponsoring organization in 2015–2016.
- Andrew Francis. "Comparing the bounds on dimensions of trivariate spline spaces." Presented at undergraduate student conferences at Kennesaw State and Towson University in 2014–2015.
- Devan DiMatteo. "Dimension of trivariate C^1 splines on double pyramid cells." Presented at undergraduate student conferences at Kennesaw State and Towson University in 2014–2015.
- Zeba Ahmed. "Exact geometry and dimension of bivariate splines." Presented at undergraduate student conference at Towson University in 2015.
- Larry Allen. "Characterization of Unconfinable Hexagonal Cells." Presented at undergraduate student conferences at Kennesaw State and Towson University in 2014–2015.
- Rachael Maddy. "Multiplication of Bernstein–Bézier polynomials." Presented at the Joint Mathematics Meetings in Baltimore in 2014.
- James Hughes. "Application of Akima's method and cubic splines." Presented at the Joint Mathematics Meetings in Baltimore in 2014.
- Larry Allen. "Dimension of the spaces of smooth bivariate splines on hexagonal partitions." Presented at undergraduate student conferences at Kennesaw State and Towson University in 2013–2014 and at the Joint Mathematics Meetings in Baltimore in 2014.
- Matthew Green. "A factorial power version of Fermat's equation." Published in Rose-Hulman Undergraduate Mathematics Journal, **13**, (2012), 44–51.
- Kimberly Rausch. "Mathematics of anamorphic art." Presented at Bridges Conference 2012; paper published in peer-reviewed conference proceedings.
- Benjamin Vogel. "The sum of two squares." Presented at Undergraduate Mathematics Research Conference at Towson, 2012.
- Applied Mathematics Laboratory project "Risk Analysis: Toxic Materials Transportation Security." Joint paper with students is referenced in the refereed publication list.

Courses Taught

- Mathematical concepts and structures II (a content course for elementary school teachers)
- Pre-Calculus, Calculus for applications, Calculus-1, Calculus-2, Calculus-3
- Differential equations
- Linear algebra, Introduction to abstract mathematics
- Applied combinatorics
- Introduction to abstract algebra
- Applied Mathematics Laboratory
- Senior seminar (a capstone course)