

MESH Consultants Inc.  
Fields Institute  
222 College St  
Toronto, Canada M5J 3J1  
(647) 546-9597

elissa.ross@meshconsultants.ca  
<http://www.elissaross.ca>

*Citizenship:* Canadian  
*Languages:* English, some French

**Research Interests**

design computation · discrete geometry · shape modelling · CAD software development · architectural geometry · scientific simulation · rigidity theory · computational geometry · tilings · mathematical and computational crystallography · interdisciplinarity

**Current Positions**

Senior Associate & OCE TalentEdge Postdoctoral Fellow  
MESH Consultants Inc.  
May 2015 - present  
&  
Visiting Researcher  
Fields Institute for Research in the Mathematical Sciences, Toronto  
May 2015 - present

**Education**

Ph.D. Mathematics, York University, 2006 – 2011  
Thesis: *Geometric and combinatorial rigidity of periodic frameworks as graphs on a torus*  
Supervisor: Walter Whiteley

M.Sc. Mathematics, University of British Columbia, 2003 – 2005  
Thesis: *The non-local growth of Penrose tilings*  
Supervisor: William Casselman

B.Sc. Mathematics, University of Guelph, 1999 – 2003, *With Distinction*  
Minor Studio Art

**Positions Held**

Technical Specialist, MESH Consultants Inc., Toronto  
September 2014 – May 2014

Postdoctoral Scholar, Department of Mathematical Sciences, Worcester Polytechnic Institute, Worcester, USA  
January 2014 – August 2014

(Maternity leave, April 2012 – January 2014)

Postdoctoral Fellow, Department of Mathematics and Statistics, York University, Toronto  
January 2012 – April 2012

**Positions Held, continued**

Postdoctoral Fellow, Fields Institute, Toronto  
Thematic Program on Discrete Geometry and Applications  
July 2011 – December 2011

**Publications**

1. *Scaffolding a skeleton: quad meshing a convolution surface*, with E. Hubert, G. Morin, A. Pantopoulou and K. Welker. To appear in Proceedings of Women In Shape Modelling 2016.
2. *Inductive constructions for combinatorial local and global rigidity*, with A. Nixon. Invited submission for the Handbook of Geometric Constraint Solving Principles, M. Sitharam, A. St. John and J. Sidman, editors, CRC Press. Submitted.
3. *Face-offsetting polygon meshes with differential offset rates*, with D. Hambleton and R. Aish. Advances in Architectural Geometry, proceedings of the fifth AAG, ETH Zurich, 40 –61, 2016.
4. *Anchored boundary conditions for locally isostatic networks*, with L. Theran, A. Nixon, M Sadjadi, B, Servatius and M. Thorpe. Physical Review E., Vol 92(5), 2015.
5. *Exact face-offsetting of polygonal meshes*, with D. Hambleton. In Computational Ecologies: Design in the Anthropocene, proceedings of 35th ACADIA Conference, ed. L. Combs and C. Perry, ACADIA, Cincinnati, 203 – 209, 2015.
6. *Inductive constructions for frameworks on a two-dimensional fixed torus*, Discrete and Computational Geometry, 54(1), 2015.
7. *Periodic rigidity on a variable torus using inductive constructions*, with A. Nixon. Electronic Journal of Combinatorics, Vol 22(1), 2015.
8. *Geometric rigidity of graphs on the torus*, with B. Servatius and H. Servatius. Proceedings of the 24th Fall Workshop on Computational Geometry, 2014.
9. *The rigidity of periodic frameworks as graphs on a fixed torus*, Contributions to Discrete Mathematics, 9(1), 2014.
10. *One brick at a time: a survey of inductive constructions in rigidity theory*, with A. Nixon. Fields Communications Series volume 70, “Rigidity and Symmetry” edited by Robert Connelly, Asia Weiss and Walter Whiteley, 2014.
11. *The rigidity of periodic body-bar frameworks on the three-dimensional fixed torus*, Philosophical Transactions of the Royal Society A, 372 (2008), 2014.
12. *The Rigidity of Spherical Frameworks: Swapping Blocks and Holes*, with W. Finbow, and W. Whiteley, SIAM Journal on Discrete Mathematics, 26(1), 280 – 304, 2012.
13. *Finite motions from periodic frameworks with added symmetry*, with B. Schulze and W. Whiteley, International Journal of Solids and Structures, 48, 1711 – 1728, 2011.

**Honours, Awards and Commissions**

- NSERC Engage Grant, with H. Huang, 2017.
- Ontario Centres of Excellence TalentEdge Postdoctoral Fellowship, 2016 - 2017
- Ontario Centres of Excellence TalentEdge Postdoctoral Fellowship, 2015 - 2016
- Commissioned artwork with Patrick Ingram. Too Cool For School Exhibition, York Quay Gallery, The Harbourfront Centre, Toronto, November 2010 – January 2011. Though the Harbourfront Centre’s national commissioning programme, Fresh Ground new works.
- Ontario Graduate Scholarship, 2009 - 2010
- Ontario Graduate Scholarship in Science and Technology (OGSST), 2008 - 2009
- NSERC PGS M, 2004 - 2005
- Peter Rodney Memorial Book Prize for best student talk, Ontario Combinatorics Workshop, University of Waterloo, May 2009
- Travel Award, Graduate Development Fund, Faculty of Graduate Studies, York University, September 2009
- NSERC Top-up award, Department of Mathematics, University of British Columbia, 2004 - 2005
- University of Guelph Department of Mathematics Book Award for Academic Excellence, (3 awards: 2000, 2001, 2002)
- University of Guelph Department of Mathematics Year Two Award, November 2001

**Selected Presentations** (\* by invitation)

- \* Pecha Kucha presentation, Symposium on Simulation in Architecture and Urban Design, Toronto, 2017.
- \* Department of Mathematics Colloquium, University of Oregon, 2017.
- \* Applied Algebra Seminar, York University, 2017.
- \* Advances in Architectural Geometry Symposium, ETH Zurich, 2016.
- \* Women In Shape Modelling Turkey, 2016.
- \* Computational Mathematics Colloquium, University of Waterloo, 2016.
- \* Association for Computer Aided Design in Architecture Conference, Cincinnati OH, 2015.
- \* Innovation Day, Fields Institute, 2015.
- \* Algebraic Combinatorics Seminar, Colorado State University, 2014
- \* AMS Special Session on Discrete Geometry and Crystallography, Baltimore, 2014
- \* Discrete Math Seminar, Worcester Polytechnic Institute, 2014
- \* Royal Society Theo Murphy International Scientific Meeting on Rigidity of Periodic and Symmetric Structures in Nature and Engineering, England, 2012
- \* CMS Special Session on Discrete Geometry, Toronto, 2011
- \* Workshop on Rigidity and Symmetry, Fields Institute, 2011
- Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM), Victoria, 2011

**Selected Presentations, continued**

- \* Carleton-Ottawa Discrete Math seminar, 2011
- \* Rigidity in Lancaster, England, 2010
- \* CMS Special Session on Discrete Geometry, Fredericton 2010
- Rigidity Day, York University, 2010
- \* CMS Special Session on Recent Trends in Discrete Geometry, Windsor, 2009
- \* Workshop on Rigidity and Volume Inequalities, Budapest, 2009
- Ontario Combinatorics Workshop, University of Waterloo, 2009
- \* AMS Special Session on Discrete Geometry, Worcester, 2009
- \* Discrete Geometry Day, Field's Institute, 2009
- \* Discrete Geometry and Combinatorics seminar, Cornell University, 2008
- \* Recent Progress in Rigidity Theory, BIRS, 2008
- Rigidity seminar series, York University, 2007

**Selected Conferences, Workshops & Research Visits** (in addition to those listed above)

Women in Shape-2: Modelling Boundaries of Objects in 2- and 3-Dimensions, Nesin Mathematics Village, Turkey, 2016

Advances in Combinatorial and Geometric Rigidity, Banff International Research Station, 2015

American Institute of Mathematics workshop "Configuration spaces of linkages," 2014

Fields Workshop on Discrete and Computational Geometry, Carleton University, Ottawa, 2010

Research visit, Wendy Finbow, St. Mary's University in Halifax, 2010

Rigidity, Flexibility, and Motion: Theory, Computation and Applications to Biomolecules, BIRS, 2008

**Teaching Activities**

*Instructor*, MA 1024: Calculus IV, Worcester Polytechnic Institute, 2014

*Instructor*, MA 2073: Introduction to Matrices and Linear Algebra II, Worcester Polytechnic Institute, 2014

*Course Director*, MATH 2022: Linear Algebra II, York University, 2010

*Tutorial Leader*, MATH 3050: Introduction to Geometries; and MATH 1200: Problems, Conjectures and Proofs; York University, 2010

*Tutor*, Math Lab, York University, 2006 – 2008

*Tutorial Leader and Occasional Guest Instructor*, MATH 1300: Differential Calculus with Applications, York University, 2007

*Teaching Assistant*, MATH 1014: Applied Calculus II, York University, 2007

*Teaching Assistant*, MATH 3410: Complex Analysis, York University, 2007

**Teaching Activities, continued**

*Teaching Assistant*, various calculus courses, University of British Columbia, 2003 - 2005

*Tutor*, The Academy for Mathematics and Science, Guelph, 2000 - 2003

**Teaching-related Professional Development**

University Teaching Practicum, York University, 2007 – 2011

Completion of a self-directed program of professional development in university teaching and learning, through the Centre for the Support of Teaching.

**Professional Experience**

*Teaching Development Graduate Assistant* Sep 2009 – Dec 2009

Organizer and facilitator of an orientation for new teaching assistants in the mathematics department, attended by over 40 TAs. Initiated and facilitated a four-part seminar series connecting researchers in mathematics education with TAs and faculty in the mathematics department.

*Math Lab Coordinator* Sep 2008 – April 2009

Responsible for the administration of York University's math help centre (Math Lab), and management of 20 tutors.

**Service***Outreach*

Keynote speaker, "Girls in STEM" conference, University of Toronto, May 2016

Contributor to "Research Notes", in the "CMS Notes", March 2016

Contributor to "Fields Notes", newsletter of the Fields Institute, December 2011

*Organizer or co-organizer of*

"Making Models: Stimulating Research In Rigidity Theory And Spatial-Visual Reasoning", workshop at the Fields Institute, August 5 - 9, 2014

Discrete Geometry session, Canadian Mathematical Society Winter Meeting, Toronto 2011

"Art Meets Science", York University, 2009 – 2010

*Referee and Review*

Math Reviews

European Journal of Combinatorics

International Journal of Structures and Solids

Philosophical Transactions of the Royal Society A

ACM-SIAM Symposium on Discrete Algorithms (SODA 2012)

27th Annual Symposium on Computational Geometry (SoCG 2011)

**Service, continued**

*Committee*

Faculty of Graduate Studies Council, York University, 2010 – 2011

Tenure and Promotion Committee, Department of Mathematics, York University, 2010 – 2011

Teaching and Learning Committee, Department of Mathematics, York University, 2009 – 2010

Department Council (Graduate Student Representative), York University, 2009 – 2010

Graduate Executive Committee, Department of Mathematics, York University, 2008 – 2009

**References**

Available upon request.