Michael Musty

Ph.D. Candidate, Mathematics, Dartmouth College

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Education

Ph.D. Mathematics, Dartmouth College, Hanover, New Hampshire, USA — expected 2019

M.Sc. Mathematics, University of Vermont, Burlington, Vermont, USA — 2014

B.A. Mathematics/Scientific Computing, Boston College, Chestnut Hill, Massachusetts, USA — 2008

Research Experience

2-Group Belyi Maps, Ph.D. Thesis — expected 2019

- Developed and implemented an algorithm to compute a database of 2-group Belyi maps up to degree 256
- Analyzed this data to steer conjectures about these objects
- Used this analysis to search for special number fields ramified only at 2
- Repository: https://github.com/michaelmusty/solvabledessins
- Visualization: https://dessin-explorer.org

Computing Canonical Rings of Hilbert Modular Forms, Programmer — 2018

- Implemented the data structure to store and compute with Fourier expansions of Hilbert modular forms
- Worked as part of a 10+ person team
- Organized the (git) workflow of the team
- Repository: https://github.com/edgarcosta/hilbertmodularforms

A Database of Belyi Maps, Co-author — 2018

- Implemented the database backend using Magma
- Computed thousands of Belyi maps up to degree 9
- Worked in a team of 4 people to migrate this data over to the LMFDB (www.lmfdb.org)
- Wrote Magma and Python scripts to convert this Magma database to MongoDB as part of the migration
- Awarded Selfridge Prize at ANTS-XIII: http://www.math.grinnell.edu/~paulhusj/ants2018/index.html
- Repository: https://github.com/michaelmusty/BelyiDB
- LMFDB: http://beta.lmfdb.org/Belyi
- Peer-Reviewed Article: [Mus+19]

Understanding the cost of dermatologic care: A survey study of dermatology providers, residents, and patients, Co-author — 2017

- Carried out the statistical analysis for survey data of this study using R
- Generated Likert scale visualizations to analyze the study data using R
- Peer-Reviewed Article: [Ste+17]

Numerical calculation of three-point branched covers of the projective line, Co-author — 2014

- Implemented a general numerical method to compute Belyi maps using power series expansions of modular forms
- Implemented code to visualize dessins d'enfants (equivalent objects to Belyi maps) conformally embedded in the hyperbolic unit disk
- Used this code to produce figures drawn using PSTricks such as in Figure 1
- Peer-Reviewed Article: [Klu+14]

Computing Iwasawa λ-Invariants, M.Sc. Thesis — 2014

- Implemented an algorithm to compute the Iwasawa λ-invariant of an abelian number field using Magma
- Repository: https://github.com/michaelmusty/iwasawa

Work Experience

Graduate Research and Teaching Assistant, Dartmouth College, Hanover, NH, USA — 2014-Present

Graduate Research and Teaching Assistant, University of Vermont, Burlington, VT, USA 2012-2014

Adjunct Professor, Norwich University, Northfield, VT, USA 2011-2013

Seasonal Landscaper, JM Landscaping, Bradford, VT, USA 2000-2011

Shipping Assistant, Pleasant View Gardens, Loudon, NH, USA 2009-2010

Permanent Substitute Teacher, Merrimack Valley High School, Penacook, NH, USA 2009-2010

Graduate Research and Teaching Assistant, McGill University, Montreal, QC, Canada 2008-2009

Misc Laborer, Glen Farm, Piermont, NH, USA 1990-2000

Publications Peer-Reviewed Articles

[Mus+19] A Database of Belyi Maps
Michael Musty, Sam Schiavone, Jeroen Sijsling, John Voight
(to appear in conference proceedings for ANTS-XIII) The Open Book Series 2 (2019). Mathematical Sciences Publishers, 2019

[Ste+17] Understanding the cost of dermatologic care: A survey study of dermatology providers, residents, and patients
Aaron J Steen, Julianne A Mann, Valerie M Carlberg, Alexa B Kimball, Michael J Musty, Eric L Simpson
Journal of the American Academy of Dermatology 76.4 (2017) pp. 609–617. Elsevier, 2017

[Klu+14] Numerical calculation of three-point branched covers of the projective line
Michael Klug, Michael Musty, Sam Schiavone, John Voight
LMS Journal of Computation and Mathematics 17.1 (2014) pp. 379–430. London Mathematical Society, 2014

Selected Talks

[1] 2-Group Belyi Maps
JMM Special Session on Number Theory, Arithmetic Geometry, and Computation, Baltimore, MD, January 2019

[2] A Database of Belyi Maps
Simons Collaboration Short Talks, Cambridge, MA, August 2018

[3] 2-Group Belyi Maps
Quebec Maine Number Theory Seminar, October 2017

[4] Computing Iwasawa λ-Invariants
Dartmouth Number Theory Seminar, Hanover, NH, February 2015

Community

Dartmouth Mathematics Youth Summer Program, Guest Lecturer, Hanover, NH, USA 2016

- Gave 2 guest lectures on probability
- Gave 2 guest lectures on knot theory

Johns Hopkins Program for Talented Youth, Guest Lecturer, Hanover, NH, USA 2015

- Gave a guest lecture on group theory

Joshua M. Stimson Math Program, Organizer, North Haverhill, NH, USA 2011-2012

- Organized a 4 week summer program in mathematics for advanced middle school students
- Organized and taught the summer program in 2011 and 2012

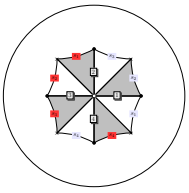

Figure 1: A genus 1 dessin d'enfant drawn using LaTeXand PSTricks.