Christopher J. Swierczewski — Résumé

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Summary of Qualifications

- **Mathematics**: computational geometry, complex algebraic geometry, numerical analysis, computer algebra systems, and partial differential equations.
- **Programming**: Python, Cython, C/C++, CUDA, Git, object-oriented design, software architecture, test-driven development, Matlab.
- Focus on high performance symbolic-numerical software design and implementaion to solve problems in computational geometry, numerical analysis, and algebraic geometry.
- Experience with parallel environments through CUDA-based GPU development.
- Effective in-person and remote (via Git/Github) collaborator. Experience in pair-programming environment and with code review processeses.
- Detail-oritented problem solver. Committed to investigating optimal solution techniques to mathematical and computational problems.

Education

- **Ph.D. in Applied Mathematics**, University of Washington, Seattle, Expected March 2016
  Advisor: Bernard Deconinck
  - Design and implementation of algebraic-numerical hybrid tools for computing with Abelian functions and Riemann surfaces in a Python-based open-source mathematical software package, "abelfunctions".
  - Applied research results to computing periodic solutions to a large class of nonlinear partial differential equations using techniques from computational geometry, numerical analysis, and algebraic geometry.
  - Focus on designing high performance code in both computer algebraic and numerical aspects of the software package in a Cython / C back-end with an easy to use Python front-end.
  - Advised two undergraduate students in related projects on quickly and accurately computing Riemann theta functions.
  - Open-source code available on GitHub: `https://github.com/cswiercz/abelfunctions`
- **M.S. in Applied Mathematics**, University of Washington, Seattle, June 2010
  Thesis: *A Python Implementation of Chebyshev Functions*
  - Studied the Chebfun system developed by Lloyd Trefethen et. al. and implemented core functionality in Python package "pychebfun" using the Numpy/Scipy Python libraries.
- **B.S. in Mathematics (Comprehensive) with Distinction**, University of Washington, Seattle, June 2008
  Thesis: *Connections Between the Sato-Tate Conjecture and the Generalized Riemann Hyptothesis*
  Advisor: William Stein
  - Researched number theoretic and computational problems with William Stein and Barry Mazur in an attempt to prove an extended form of the Sato-Tate Conjecture
  - Results published in AMS Bulletin v.45 no.2 (Fall 2007 - Spring 2008)

Professional Experience

- **Research Mathematician**, Institute for Defense Analysis: Center for Communications Research, La Jolla, CA. June – August 2012
- **Software Developer**, Simulab Corporation, Seattle, WA. January 2009 – March 2009.
  - Researched theory and applications of Hidden Markov Models to problems in control theory.
  - Implemented Hidden Markov Model C/C++ library, GHMM, in the EDGE project: a surgical trainer for evaluating surgeon performance.
- **Sage: Mathematics Software Developer**, Department of Mathematics, University of Washington, Seattle, WA. September 2007 – September 2008.
  - Designed new Sage finance module around the Opentick financial data acquisition API. Devised methods of wrapping asynchronous functions in a synchonous environment.
  - Designed tests and wrote documentation for mathematical functions in Python, Cython, and C/C++ under a UNIX environment.
- **Applied Research Mathematician**, National Security Agency, Ft. Meade, MD. June – August 2007.
  - Applied algebraic, probabalistic, and statistical methods to improve cryptoanalytic attacks against telecommunication encryption standards.
  - Collaborated with mathematicians in researching cryptographic algorithm weaknesses. Implemented algorithms in C.
- **Teaching Assistant and Math Camp Counselor**, Department of Mathematics, University of Washington, Seattle, WA. June – August 2005 and 2006.

Teaching Experience

- **Instructor**, University of Washington, Seattle:

- AMATH 301:	Beginning Scientific Computing	Summer 2014
- AMATH 301:	Beginning Scientific Computing	Summer 2011

- **Teaching Assistant**, University of Washington, Seattle:

- AMATH 301:	Beginning Scientific Computing	Winter 2015
- AMATH 351:	Introduction to Differential Equations and Applications	Autumn 2014
- AMATH 301:	Beginning Scientific Computing	Winter 2011
- AMATH 301:	Beginning Scientific Computing	Autumn 2010
- MATH 125:	Calculus with Analytic Geometry II	Spring 2010
- MATH 124:	Calculus with Analytic Geometry I	Winter 2010

AMATH 301 – An undergraduate course in numerical analysis. Computational solutions to linear systems, curve / data fitting, numerical integration and differentiation, solutions to differential equations, and optimization.

AMATH 351 – Standard techniques in solving first and second order equations, series solutions, Laplace transform, systems of linear equations and introductory linear analysis, systems of nonlinear equations and perturbation theory.