

Curriculum Vitae

Benjamin Dyhr

Department of Mathematics
The University of Arizona
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Education:

The University of Arizona, 2003-present
Major: Mathematics (PhD)
GPA: 3.64
Advisor: Tom Kennedy
Expected graduation date: May 2009

Northwestern University, 2000-2001
Degree: M.S., Applied Mathematics
GPA: 3.50

Northern Arizona University, 1995-2000
Degree: B.A., Mathematics
GPA: 3.31

Professional Goal:

Although my formal education is primarily in mathematics and applied mathematics, my ultimate goal is to apply my mathematical expertise to the natural sciences. In particular, I am interested in mathematical models in Climatology, Hydrology and Biology, among others, that incorporate multivariate statistics, stochastic processes (discrete and continuous) and solutions of stochastic differential equations. Having researched both applied statistics and lattice models of mathematical physics extensively, I consider statistical inference among my most valuable assets as a human resource. My professional goal is to find a professional or postdoctoral position that allows me to apply my mathematical expertise to a problem in the natural sciences in a way that is beneficial to other experts working in that field. I would regard such a position as a tremendous opportunity to contribute my knowledge to a real world problem while furthering my education on a specific field of the natural sciences.

Stochastic Differential Equations in Hydrology:

During my PhD education in mathematics at the University of Arizona, I have focused primarily on mathematical statistics and probability, stochastic processes, and solutions of stochastic differential equations. I am also completing courses in graduate-level Hydrology and Stochastic Methods in Hydrology. The latter of these courses includes extensive use of the programming language MATLAB for use in time series analysis of stochastic hydrological data. My experience with MATLAB includes proficiency in the neural network oriented package NETLAB. I have further experience programming MATLAB and C++ code for the purpose of numerically analysing both stochastic and deterministic partial differential equations during my applied mathematics M.S. education in Applied Mathematics at Northwestern University.

Mathematical Research:

The focus of my dissertation research is a stochastic differential equation called Schramm-Loewner evolution (SLE), which is correctly visualized as a random, fractal path that is embedded in the plane. This fractal is known to correspond to certain interfaces that have arisen from a wide range of applications in statistical mechanics and mathematical physics. It has been used, for example, to rigorously derive exact values for critical exponents conjectured by physicists decades ago. In May of 2006 I defended a thesis on SLE that describes a new method for generating explicit, converging approximations to any solution of the equation.

Schramm-Loewner evolution is a random solution of a nonlinear stochastic differential equation called the chordal Loewner equation. In general, there is a parameter in the Loewner equation that can be given by any continuous, real-valued input function. For SLE, this input function is a Brownian motion without drift. The written part of my oral examination, completed on November 17, 2006, reviewed the proof of a difficult but foundational result on SLE: the existence of the fractal object called the SLE generating curve. This proof was originally published in a paper by Steffen Rohde and Oded Schramm in 2004. For my dissertation research, I am analysing solutions of the chordal Loewner equation when the input function is Brownian motion with a nonzero drift coefficient, μ . In particular, I am identifying long term spatial and temporal stationarity properties of the generating curve in this special case. I would like to compare and contrast

a certain stationary limit of the generating curve with interfaces associated with near-critical scaling limits of lattice models from mathematical physics.

My projected graduation date from the University of Arizona Mathematics PhD program is May 2009.

Fieldwork Experience:

I have several vocational experiences doing fieldwork projects that have fit into the gaps in my academic schedule:

August 2008. USGS: Southwest Biological Science Center, Sonoran Desert Research Station. Estimating water use by riparian plants (Cibolla National Wildlife Refuge). Short assignment, roughly 80 hours of work. Contact Pam Nagler at pnagler@Ag.arizona.edu.

March 2008. University of Utah: Kevin Hultine, Biology Department. Estimating transpiration rates of riparian plants across a solidity gradient. Short assignment, roughly 40 hours of work. Contact Keven Hultine at hultine@biology.utah.edu.

May 2007. USGS: Southwest Biological Science Center, Sonoran Desert Research Station. Estimating water use by riparian plants (Cibolla National Wildlife Refuge). Short assignment, roughly 120 hours of work. Contact Pam Nagler at pnagler@Ag.arizona.edu.

July 2003. Darling Environmental, Tucson, AZ. Rare plant survey for developments near Green Valley, AZ. We were primarily interested in locating Pima Pineapple Cacti. Contact Rich Darling at Rich@darlingltd.com.

May-June 2003. Northland Research Inc. Flagstaff, AZ. Continuing archaeological survey of the Marine Corp base in Twentynine Palms, California. Contact Mark at mz@infomagic.net.

August 2002 - January 2003. SWCA, Flagstaff, AZ. Part time archaeologist for several archaeological projects including excavation of a late archaic site in St. George, Utah; excavation of Pueblo pit houses near St. Johns, Utah; prehistoric and historic surveys of the Rodeo-Chedeki fire burn area in Arizona and the Bond Ranch of Chino Valley, Arizona. Please contact Lneal@swca.com or info-flagstaff@swca.com.

Teaching Experience:

August 2004-May 2006. Fall 2006-2007. Graduate Teaching Assistantship with the University of Arizona Department of Mathematics. I was sole lecturer for courses in College Algebra, Math and Modern Society, Pre-Calculus, and Calculus. Please contact Teena Deemer at deemer@math.arizona.edu. I also was a 'super ta' assistant lecturer for graduate courses in Real Analysis (B Velez), Probability (J Watkins) and Stochastic Differential Equations (J Wehr), and assisted in three one-day high school math workshops hosted by the University of Arizona.

August 2001- July 2002. Adjunct instructor at Northern Arizona University's Department of Mathematics. I was sole lecturer for courses in College Algebra, Finite Mathematics, Pre-Calculus, and Calculus. Please contact Janet McShane at janet.mcshane@nau.edu.

August 1996- May 2000. As an undergraduate student at Northern Arizona University, I tutored mathematics at the University-funded Learning Assistance Center from the 1996-97 academic year thru the 1999-2000 academic year.

Membership in Professional Societies:

Mathematical Association of America

Graduate Summer Schools:

July 10- 23, 2005. First Cornell Summer School in Probability.

July 1-21, 2007. Park City Mathematics Institute 2007 Summer program in Statistical Mechanics.

Colloquia and Seminars Presented:

April 26, 2006. University of Arizona, Mathematical Physics Seminar. "Discrete Loewner Chains."

September 26, 2006 (12:40pm). Northern Arizona University, Applied Seminar. "Markov Chains and Random Walks."

September 26, 2006 (4pm). Northern Arizona University, Department Colloquium. "Schramm Loewner Evolution."

November 8, 2006. University of Arizona, Mathematical Physics Seminar. "SLE Phases."

