Andy C. Huang

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EDUCATION AND HONORS

Rice University, Houston, TX
    Ph.D. in Mathematics (Advisor: Dr. Mike Wolf, GPA 3.96)   May 2016
        Dissertation Title: "Handle crushing harmonic maps between surfaces"
    M.A. in Mathematics (GPA: 4.04)   May 2012
University of California, Davis, Davis, CA
    B.S. in Mathematics with Departmental Citation (Major GPA: 3.85)   May 2010
Budapest Semesters in Mathematics, Budapest, Hungary   Dec 2009

COMPUTER SKILLS

Programming languages: C++, C, Python
Software: Trilinos, Git, MATLAB, Mathematica, CUBIT, ParaView, LaTeX, OpenCV, scikit-learn

PROFESSIONAL EXPERIENCE

Sandia National Laboratories, Albuquerque, NM   **Jan 2019 - present**
Senior Member of the Technical Staff, Computer Science
Code developer for two MPI-parallel and GPU supported C++ physics simulation codes, for semiconductor physics and electromagnetcs. Main work and research focus on numerical formulations, solver acceleration and stability, and physics implementation. On-going work include:
- Acceleration of frequency-domain analysis in semiconductor physics simulation code, Charon (project homepage: `https://charon.sandia.gov`).
- Multi-physics coupling of some of Sandia's simulation codes, including Xyce.
- Electromagnetics simulation code solver acceleration for high-performance computing platforms.

Sandia National Laboratories, Albuquerque, NM   **Jul 2016 - Jan 2019**
Postdoctoral appointment (within Sandia's semiconductor device modelling team)
Designed and implemented (in C++) a frequency-domain analysis method in Sandia's semiconductor device physics simulation code, Charon. Required extensive communication and cooperation with other developers to minimize disruption while extending code capability.

Sandia National Laboratories, Albuquerque, NM   **May 2015 - Jun 2016**
Graduate student intern, mentor: Xujiao (Suzey) Gao
Compared and analyzed numerical stabilization schemes for finite element and control volume methods for the simulation of coupled transient drift-diffusion equations modelling semiconductor physics. Implemented these stabilization schemes in Sandia's TCAD program, Charon (in C++).

RESEARCH AND PROJECTS

Modeling of harmonic maps between surfaces   **Mar 2012 - Jun 2016**
Implementation of finite element methods in Matlab, and porting to Python with C libraries for optimization. Analyzed a transient semi-linear elliptic PDE. Obtained for examples considered in thesis.

Developed a Windows 8.1 phone app: "KnowYoNotes"   **Feb 01, 2015**
GitHub repo avilable at: `https://github.com/andy-c-huang/KnowYoNotes`
Developed the interface for a sheet music reading learning app. Written in C#, involving event driven programming. Further development ongoing. Created for Rice's 2015 24 hour hackathon, HackRice.

Travelling wave phenomena: Wave reflection in excitable media   **Sept 2008 - Jun 2009**
Investigated wave reflection phenomena in modified, coupled Fitzhugh-Nagumo equations. Explored existence and stability of anti-phase behavior in periodic solutions - interpreted biologically as a cause for cardiac arrhythmia. McNair Scholars Program funded. Advisor: Dr. Timothy Lewis (UC Davis).

Spread of Avian Influenza Across Heterogeneous Farmscapes   **Sept 2007 - Sept 2008**
Modeled spread of the H5N1 virus on farm networks of varying spatial heterogeneity using coupled, stochastic compartment models. Analyzed effect of heterogeneity on potential for a large outbreak. Presented to panel of poultry industry leaders, including Foster's Farms. UC Davis and NSF funded.

GRANTS AND AWARDS		
	1. SIAM Science Policy Fellowship	**Jan 2019 - Dec 2020**
	2. GEAR Graduate Internship award to work with Dr. Domingo Toledo at the University of Utah in Salt Lake City, Utah	**Mar 2016**
	3. GEAR short-term visit award to work with Dr. Bill Goldman at the Mathematical Sciences Research Institute in Berkeley, CA	**Jun 2015**
	4. National Association of Math Circles Exchange grant	**2014**
	5. National Association of Math Circles Seed grant	**2013**

PUBLICATIONS AND PRESENTATIONS		
	1. *An Isofrequency Remapping Scheme for Harmonic Balance Methods* SIAM Conf. on Computational Science and Engineering in Spokane, WA	**Feb. 26, 2019**
	2. *Analytic band-to-trap tunneling model including band offset for heterojunction devices* Xujiao Gao, Bert Kerr, and Andy Huang In: Journal of Applied Physics 125, 054503 (2019) `https://doi.org/10.1063/1.5078685`	
	3. *Non-degenerate harmonic balance via isofrequency remapping* (in preparation)	
	4. *Developing a harmonic balance method for Charon* Trilinos Users Group meeting in Albuquerque, NM	**Oct. 24, 2018**
	5. *A versatile harmonic balance method in a parallel framework* A. Huang, X. Gao, R. Pawlowski, J. Gates, L. Musson, G. Hennigan, M. Negoita International Conference on Simulation of Semiconductor Processing and Devices (SISPAD) `http://dx.doi.org/10.1109/SISPAD.2018.8551620`	**Sept 25, 2018**
	6. *A harmonic balance method for PDEs* (SAND2016-12293)	
	7. *Development of harmonic balance capability for Charon* (SAND2018-3623)	
	8. *Efficient band-to-trap tunneling model including heterojuntion band offset* Xujiao Gao, Andy Huang, and Bert Kerr In: ECS Transactions, vol. 80, pp. 10051015, 2017.	
	9. *Harmonic maps of punctured surfaces to the hyperbolic plane* In: *Communications in Analysis and Geometry* (to appear) Preprint available at `http://arxiv.org/abs/1605.07715`	
	10. *Using geometric maximum principles to harmonically crush handles* GEAR Workshop: Analytic Aspects of Higher Teichmüller Theory at Rutgers University, Newark	**Sep 10, 2016**
	11. *Handle crushing harmonic maps between surfaces* Max Dehn Seminar at the University of Utah, Math Department	**Mar 30, 2016**
	12. *On harmonic maps between non-compact surfaces of different genera* AMS Special Session (at Rutgers Univ.): Aspects of Minimal Surfaces in Riemannian Manifolds	**Nov 15, 2015**
	13. *Implementation of different stabilization schemes in Charon using Trilinos/Panzer* X. Gao, A. Huang, K. Peterson, G. Hennigan, L. Musson, and P. Bochev Presented by X. Gao at the Trilinos User Group meeting Albuquerque, NM	**Oct. 27, 2015**

PROFESSIONAL DEVELOPMENT	
	Enthought's Machine Learning Mastery Workshop (May 21-23 2018) Kokkos tutorial (Dec. 5, 2017) Enthought's Python for Scientists and Engineers (Sept. 11-15, 2017) Introduction to CUBIT (Nov. 15, 2016) ParaView (Aug. 3-5, 2016)

CONFERENCES	Trilinos User-Developer Group meeting in Albuquerque, NM (Oct 23-25, 2018)

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Trilinos User-Developer Group meeting in Albuquerque, NM (Oct 23-25, 2018)
Intl. Conf. on Simulation of Semiconductor Processing and Devices in Austin, TX (Sept. 24-26, 2018)
IEEE Intl. Symp. on Antennas and Propagation APS/USRI in Boston, MA (Jul 8-13, 2018)
Trilinos User-Developer Group meeting in Albuquerque, NM (Oct. 23-25, 2017)
SIAM Conference on Computational Science and Engineering in Atlanta, GA (Feb 27 - Mar 3, 2017)

LEADERSHIP

Head Mechanic at Rice Bikes   **Jul 2013 - May 2016**
Oversaw student-run bike shop mechanic training at Rice University. Organized bike builds for the rental bike fleet, using it as a training platform for team of 10. Coordinated monthly, themed bike rides for Rice students to safely tour areas of Houston. Re-structured mechanics operations for efficiency.

Rice Math Circle co-organizer   **Aug 2012 - May 2014**
Coordinated and designed 3-hour, bi-weekly sessions run by graduate students exploring math topics through problems, puzzles, and games. Middle- and high-school student audience. Topics included: graph theory, discrete probability, combinatorics, game theory, minimal surfaces, programming.

Instructor (at Rice University)
Ordinary Differential Equations (Math 211), Calculus II (Math 102)   **Spring 2013, Summer 2012**

Teaching Assistant   **Sept 2010 - May 2016**
Conducted office hours, led weekly discussions, and graded homework. *Courses:* Single and multi-variable calculus, Ordinary and partial differential equations, Riemannian geometry, Real Analysis

SERVICE AND
OUTREACH

Math Counts volunteer   **Feb 10, 2018**
scored exams from Math COUNTS competition at Albuquerque Academy

Community Involvement brainstorm   **Dec 12, 2016**
Participated in a discussion lead by Tineca Quintana (org 3652)

"Changing the Equation" Career Spotlight interview   **Dec 6, 2016**
used in Explora math kits designed for after school activities, put together by Amy Tapia (org 3652)

Mars Bus Experience volunteer   **Oct 27, 2016**
at Van Buren Middle School, organized by Tineca Quintana (org 3652)

Invited presenter: "How to be efficient (in some sense)"   **Mar 14, 2015**
as part of a Pi Day celebration at NASA's Space Center Houston

Minimal surfaces and soap films demonstration   **Nov 4, 2012**
as part of the Weiss School of Natural Sciences alumni open house at Rice University