

MARIA HOLLAND

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EDUCATION

Ph.D., Mechanical Engineering 2017
Stanford University (Stanford, CA)
Advisor: Ellen Kuhl
Dissertation: “Computational Modeling of the Brain: Development, Health, and Disease”

M.S., Mechanical Engineering 2013
Stanford University (Stanford, CA)

B.S., Mechanical Engineering 2011
University of Tulsa (Tulsa, OK)
Magna cum laude, Minors: Mathematics & Chinese

Certificate, Chinese Language & Culture 2010
Xiamen University (Xiamen, Fujian Province, China)

PROFESSIONAL APPOINTMENTS

University of Notre Dame (Notre Dame, IN) 2017 – present
Clare Boothe Luce Assistant Professor
Department of Aerospace & Mechanical Engineering

Stanford University (Stanford, CA) 2017
Visiting Assistant Professor
Department of Mechanical Engineering

PUBLICATIONS

Peer-Reviewed Publications (Trainees are underlined)

- [1] Colin J, Darayi M, and **Holland MA** (2018). “Stiffness contrast and separation influence wrinkling of adjacent layers in a homogeneous matrix”. Submitted
- [2] Colin J and **Holland MA** (2019). “Layer Wrinkling in an Inhomogeneous Matrix”. *Int. J. Solids Struct.* 156-157:119–125. DOI: 10.1016/j.ijsolstr.2018.08.004
- [3] **Holland MA**, Budday S, Goriely A, and Kuhl E (2018). “Symmetry breaking in wrinkling patterns: Gyri are universally thicker than sulci”. *Phys. Rev. Lett.* 121:(22), 228002. DOI: 10.1103/PhysRevLett.121.228002
- [4] Oomen PJA, **Holland MA**, Bouten CVC, Kuhl E, and Loerakker S (2018). “Growth and Remodeling Play Opposing Roles during Postnatal Human Heart Valve Development”. *Sci. Rep.* 8 (1). DOI: 10.1038/s41598-018-19777-1
- [5] **Holland MA**, Li B, Feng XQ, and Kuhl E (2017). “Instabilities of Soft Films on Compliant Substrates”. *J. Mech. Phys. Solids* 98:350–365. DOI: 10.1016/j.jmps.2016.09.012
- [6] **Holland MA**, Miller KE, and Kuhl E (2015). “Emerging Brain Morphologies from Axonal Elongation”. *Ann. Biomed. Eng.* 43 (7):1640–1653. DOI: 10.1007/s10439-015-1312-9

- [7] **Holland MA**, Kosmata T, Goriely A, and Kuhl E (2013). “On the Mechanics of Thin Films and Growing Surfaces”. *Math. Mech. Solids* 18 (6):561–575. DOI: 10.1177/1081286513485776
- [8] Zöllner AM, **Holland MA**, Honda KS, Gosain AK, and Kuhl E (2013). “Growth on demand: Reviewing the mechanobiology of stretched skin.” *J. Mech. Behav. Biomed. Mat.* 28: 495-509. DOI: 10.1016/j.jmbbm.2013.03.018

Conference Publications

- [1] French JJ, Clancy CT, Johnston AL, Holland MA, and Henshaw JM (2009). “Design and Fabrication of the Energy Generating Components for the Sustainable Shepherd’s Residence in Northeastern China”. *ASME 2009 3rd Intl. Conf. Energy Sustain.* 2: 237–244. DOI: 10.1115/ES2009-90074

Other Publications

- [1] **Holland MA** (2017). “The Hitchhiker’s Guide to Abaqus”. *Github Repository*. DOI: 10.5281/zenodo.1243270

HONORS & AWARDS

- Henry Luce Foundation, Clare Boothe Luce Professorship 2017
- Stanford University, Diversifying Academia, Recruiting Excellence (DARE) Fellowship 2015
- Stanford University, Brit and Alex d’Arbeloff Graduate Fellowship 2011
- Phi Beta Kappa 2011
- Chinese Ministry of Education, China Scholarship Council Scholarship 2009
- Morris K. Udall Scholarship 2009
- Barry M. Goldwater Scholarship 2008

GRANTS & FELLOWSHIPS

- Notre Dame Advanced Diagnostics & Therapeutics Discovery Award 8/16/2018–8/15/2019
Cortical Thickness Variation as a Biomarker for Autism Spectrum Disorders (M. A. Holland, PI) \$42,685
- NSF OISE-1515340 East Asia & Pacific Summer Institute 6/1/2015–5/31/2016
EAPSI: Investigation of the Wrinkling and Buckling Behavior of Layered Soft Materials with Applications in the Developing Brain (M. A. Holland, PI)
- NSF DGE-1147470 Graduate Research Fellowship 9/1/2013–8/31/2017
Establishing, Calibrating, and Validating a Mechanistic, Patient-Specific, Multiscale Model for Heart Failure Through Sarcomerogenesis (M. A. Holland, Fellow)

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- American Society of Mechanical Engineers (ASME), Member 2018 – present
- International Association for Computational Mechanics (IACM), Member 2018 – present
- US Association for Computational Mechanics (USACM), Member 2018 – present
- American Society of Engineering Education (ASEE), Member 2018 – present

PRESENTATIONS

Invited Talks

- [1] “Mechanics of Brain Morphology: Cortical Thickness Variations” 13 Nov 2018
Stanford University School of Engineering Stanford, CA
- [2] “Mechanics of Instabilities in the Brain and Other Soft Materials” 13 Sep 2018
Indiana U. - Purdue U. Indianapolis Dept. of Mechanical & Energy Engineering Indianapolis, IN
- [3] “Computational Mechanics of Morphology in the Brain” 9 July 2018
University of Xiamen School of Architectural & Civil Engineering Xiamen, China
- [4] “Computational Mechanics of Morphology in the Brain” 6 July 2018
Tsinghua University Institute of Biomechanics and Medical Engineering Beijing, China
- [5] “Computational Modeling of the Brain: Development, Health, and Disease” 24 March 2017
University of Texas at El Paso Dept. of Mechanical Engineering El Paso, TX
- [6] “Computational Modeling of the Brain: Development, Health, and Disease” 13 March 2017
Catholic University of America Dept. of Mechanical Engineering Washington, D.C.
- [7] “Computational Modeling of the Brain: Development, Health, and Disease” 7 March 2017
University of Notre Dame Dept. of Aerospace & Mechanical Engineering Notre Dame, IN
- [8] “Computational Modeling of the Brain: Development, Health, and Disease” 3 March 2017
University of Tulsa Dept. of Mechanical Engineering Tulsa, OK
- [9] “Computational Modeling of the Brain: Development, Health, and Disease” 17 February 2017
Villanova University Dept. of Mechanical Engineering Villanova, PA
- [10] “Computational Modeling of the Brain: Development, Health, and Disease” 2 February 2017
University of Texas at Dallas Dept. of Mechanical Engineering Richardson, TX
- [11] “Computational Modeling of the Brain: Development, Health, and Disease” 31 January 2017
University of North Texas Dept. of Mechanical & Energy Engineering Denton, TX

Conference Talks

- [1] **Holland MA**, Goriely A, and Kuhl E. “Physiological and pathological cortical thickness variations,” *World Congress of Computational Mechanics*. New York, NY, 25 July 2018.
- [2] **Holland MA**, Hardan AY, Goriely A, and Kuhl E. “Thickness variations resulting from symmetry breaking in soft matter instabilities,” *U.S. National Congress for Theoretical and Applied Mechanics*. Chicago, IL, 7 June 2018.
- [3] **Holland MA**, Li B, Feng XQ, and Kuhl E. “Instabilities in Growing or Compressed Bilayered Systems With Low Stiffness Contrast,” *World Congress of Computational Mechanics*. Seoul, South Korea, 26 July 2016.
- [4] **Holland MA** and Kuhl E. “The Effect of White Matter Anisotropy on Cortical Folding During Development,” *World Congress of Computational Mechanics*. Barcelona, Spain, 23 July 2014.
- [5] **Holland MA**, Steinmann P, and Kuhl E. “Theory and Numerics of Volume and Surface Growth in the Developing Brain,” *U.S. National Congress of Computational Mechanics*. Raleigh, NC, 24 July 2013.

Posters

- [1] Vijayakumar N, **Holland MA**, and Kuhl E. “A Mechanical Model for Cortical Folding During Brain Development,” Summer Biomechanics, Bioengineering and Biotransport Conference, Snowbird, UT, June 2015.

TEACHING

Instructor of Record

Notre Dame AME 50572: Introduction to Biomechanics

- Spring 2018: 34 students (CIF Composite Score 4.6/5.0) 2018
- Spring 2019 2019

Course Assistant

- Stanford Graduate Summer Institute: Jumpstart Your Academic Job Search 2016-2017
- Stanford ME 337: Mechanics of Growth 2013

Pedagogical Training

- A Practical Guide to Teaching and Learning in STEM conference (Notre Dame) 2018
- Stanford EDUC 297: Teaching and Learning in Higher Education 2016
- Stanford ENGR 312: Science and Engineering Course Design 2015

RESEARCH ADVISING

Graduate Students

- Mohsen Darayi (Notre Dame AME Ph.D. program) 2018 – present

Undergraduate Students

- Mia Hoffman (Notre Dame B.S.M.E. ‘21) Fall 2018
- Kyra Twohy (Notre Dame B.S.M.E. ‘18) Spring 2018
- Nithya Vijayakumar (Stanford B.S.M.E. ‘15, now at U. Michigan Medical School) Summer 2014
- Nick Forsch (Wash U. B.S.M.E. ‘14, now Ph.D candidate at UC San Diego) Summer 2013

SERVICE

Professional Service

- Organizer, “Imaging-based Modeling in Biomechanics” Minisymposium July 2018
U.S. National Congress of Computational Mechanics, Austin, TX
- Reviewer, *Mathematics and Mechanics of Solids*
- Reviewer, *International Journal of Non-Linear Mechanics*
- Reviewer, *Journal of the Mechanics and Physics of Solids*

University Service

- Notre Dame Introduction to Engineering Summer Program, Speaker 2018
Lectured on “Introduction to [Brain] Biomechanics”.

- Notre Dame College of Engineering Future Faculty Workshop, Moderator 2018
Participated in panel on “Preparing a Research and Teaching Statement”.
- Stanford University Career Education, Instructor 2016–2017
Presented workshop on “Writing an Effective Diversity Statement”.
- Stanford University Committee for Graduate Studies, Student Member 2014–2017
Reviewed, formulated, and approved policies governing graduate education.
- Stanford University Office of Community Standards, Judicial Panelist 2015–2016
Adjudicated cases involving violations of academic integrity.

Outreach & Mentoring

- Women Leaders in STEM Program, Mentor 2018 – present
Met regularly with mentee to discuss personal & professional development.
- National Biomechanics Day, Host 2017
Introduced high school students to biomechanics research on the brain.
- Project Motivation, Volunteer 2015–2016
Spoke to groups from underrepresented backgrounds about experiences at college to broaden their knowledge and expectations of higher education.
- Brain Day, Volunteer 2015–2016
Led interactive classes for middle school students about the form and function of the brain, using hands-on activities, including preserved human and animal brains.
- Society of Women Engineers and El Centro Chicano y Latino, Mentor 2012–2015
Met regularly one-on-one with three undergraduates to facilitate the transition to college and advise on majors, courses, activities, time management, etc.

OTHER SKILLS

Languages

- English (Native)
- Spanish (Advanced conversational level, oral and written)
- Mandarin Chinese (Advanced conversational level, oral and written)