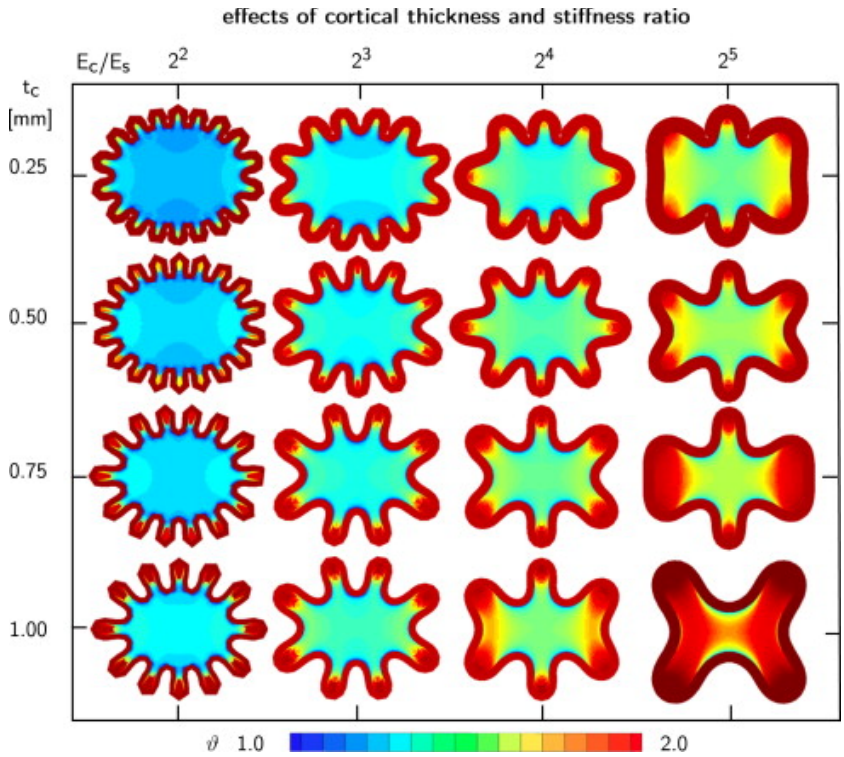
Professor Ellen Kuhl



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https://www.researchgate.net/profile/Ellen_Kuhl
https://www.researchgate.net/profile/Ellen_Kuhl/publications

Departments of Mechanical Engineering, Bioengineering and Cardiothoracic Surgery
Stanford University, Stanford, California

Autobiography:
I am a Professor of Mechanical Engineering, Bioengineering (courtesy), and Cardiothoracic Surgery (courtesy). My area of professional expertise is living matter physics, the creation of theoretical and computational models to predict the acute and chronic response of living structures to environmental changes during development and disease progression. My specific interest is the multiscale modeling of growth and remodeling, the study of how living matter adapts its form and function to changes in mechanical loading, and how this adaptation can be traced back to structural alterations on the cellular or molecular levels. Growth and remodeling might be induced naturally, e.g., through elevated pressure, stress, or strain, or interventionally, e.g., through prostheses, stents, tissue grafts, or stem cell injection. Combining theories of applied mathematics, biophysics, and continuum mechanics, my lab has specialized in predicting the evolution of form and function in living structures using patient-specific custom-designed finite element models. These models can serve as diagnostic and predictive tools to explain human brain development and malformations associated with neurological disorders such as lissencephaly, polymicrogyria, schizophrenia, and autism.

Education:
Habilitation, TU Kaiserslautern, Germany, Mechanics (2004)
PhD, University of Stuttgart, Germany, Civil Engineering (2000)
Dipl.-Ing., Leibniz University of Hannover, Germany, Computational Engineering (1995)

Honors and Awards:
Humboldt Research Award, Alexander von Humboldt Stiftung (2016)
NSF Career Award, National Science Foundation (2010-2014)
Hellman Faculty Scholar, Hellman Faculty Scholar (2009)
Habilitation Research Fellowship, German National Science Foundation (DFG) (2001-2004)
Graduate Research Fellowship, German National Science Foundation (DFG) (1996-1999)

Selected Publications:
J. Zhang, M.M. Michalenko, E. Kuhl, T.C. Ovaert, "Characterization of indentation response and stiffness reduction of bone using a continuum damage model", J. Mech. Behav. Biomed. Mater., 3 (2010), pp. 189-202
S. Göktepe, O.J. Abilez, E. Kuhl, "A generic approach towards finite growth with examples of athlete's heart, cardiac dilation, and cardiac wall thickening", J. Mech. Phys. Solids, 58 (2010), pp. 1661-1680
A. Buganza Tepole, C.J. Ploch, J. Wong, A.K. Gosain, E. Kuhl, "Growing skin—a computational model for skin expansion in reconstructive surgery", J. Mech. Phys. Solids, 59 (2011), pp. 2177-2190
Menzel, A., Kuhl, E., 2012. Frontiers in growth and remodeling. Mech. Res. Commun. 42, 1–14.
H. Schmid, L. Pauli, A. Paulus, E. Kuhl, M. Itskov, "Consistent formulation of the growth process at the kinematic and constitutive level for soft tissues composed of multiple constituents", Comput. Methods Biomech. Biomed. Engin., 15 (2012), pp. 547-561
A.M. Zöllner, O.J. Abilez, M. Böl, E. Kuhl, "Stretching skeletal muscle—chronic muscle lengthening through sarcomerogenesis", PLoS One, 7 (10) (2012), p. e45661
M.A. Holland, T. Kosmata, A. Goriely, E. Kuhl, "On the mechanics of thin films and growing surfaces", Math. Mech. Solids, 18 (2013), pp. 561-575
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M. Eskandari, M.R. Pfaller, E. Kuhl, "On the role of mechanics in chronic lung disease", Materials, 6 (2013), pp. 5639-5658
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Brian Baillargeon, Nuno Rebelo, David D. Fox, Robert L. Taylor and Ellen Kuhl, "The living heart project: A robust and integrative simulator for human heart function", European Journal of Mechanics – A/Solids, Vol. 48, pp 38-47, November-December 2014
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S. Budday, E. Kuhl, J.W. Hutchinson, Period-doubling and period-tripling in growing bilayered systems, Phil. Mag. (2015), pp. 1–17
A. Goriely, J.A.W. van Dommelen, M.G.D. Geers, G. Holzapfel, J. Jayamohan, A. Jérusalem, S. Sivaloganathan, W. Squier, S. Waters, E. Kuhl, Mechanics of the brain: Perspectives, challenges, and opportunities, Biomech. Model. Mechanobiol., 14 (5) (2015), pp. 931–965
S. Budday, P. Steinmann, A. Goriely, E. Kuhl, Extreme Mech. Lett. (2015)
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