



Figure 6. (colour online) Emerging instability patterns of primary and secondary bifurcations: symmetric sinusoidal wrinkling, non-symmetric periodic wrinkling, period-doubling, period-tripling, period-quadrupling, period-quintupling (from top to bottom).

The middle image above is from: Budday S., Steinmann P., Kuhl E.: Physical biology of human brain development, *Frontiers in Cellular Neuroscience* 9 (2015), p. 1-13, ISSN: 1662-5102

The right-most image above is from: Budday S., Kuhl E., Hutchinson JW.: Period-doubling and period-tripling in growing bilayered systems, *Philosophical Magazine* - (2015), p. 1-17, ISSN: 1478-6443

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Biography:

Silvia Budday, currently an Independent Junior Research Group Leader in the Emmy Noether-Programme (“**BRAINACS** – BRAIn mechaNics ACross Scales”) at the LTM, studied Mechanical Engineering at the Karlsruhe Institute of Technology (KIT), where she graduated with one of the four best Bachelor’s degrees in 2011 and the best Master’s degree of a female student in 2013. During her Master’s studies, she spent one year abroad at Purdue University, Indiana, USA, for which she received an international scholarship by the DAAD (German Academic Exchange Service). She was also a scholar of the German Academic Scholarship Foundation. She did her PhD on “The Role of Mechanics during Brain Development” at FAU supervised by Prof. Paul Steinmann in close collaboration with Prof. Ellen Kuhl at Stanford University and Prof. Gerhard Holzapfel at Graz University of Technology. She finished her PhD in December 2017 with “summa cum laude” and was awarded the GACM Best PhD Award (German Association for Computational Mechanics) and the ECCOMAS Best PhD Award for one of the two best PhD theses in the field of Computational Methods in Applied Sciences and Engineering in Europe in 2017. Furthermore, she received the Bertha Benz-Prize from the Daimler und Benz Stiftung as a woman visionary pioneer in engineering, and the 2017 Acta Journals Students Award. In July 2018, she received an Emerging Talents Initiative (ETI) Grant, and in October 2018 an Emerging Fields Initiative (EFI) Grant by the FAU. Since April 2019, she is an Independent Junior Research Group Leader in the Emmy Noether-Programme by the German Research Foundation (DFG). Her work focuses on experimental and computational soft tissue biomechanics with special emphasis on brain mechanics and the relationship between brain structure and function.

Selected Publications:

· Budday S., Kuhl E., Raybaud C.: A mechanical model predicts morphological abnormalities in the developing human brain, *Scientific Reports* 4 (2014) ISSN: 2045-2322

- Budday S., Steinmann P., Kuhl E.: The role of mechanics during brain development, *Journal of the Mechanics and Physics of Solids* 72 (2014), p. 75-92, ISSN: 0022-5096
- Budday S., Steinmann P., Kuhl E.: A mechanical approach to explain cortical folding phenomena in healthy and diseased brains, *GAMM 2014* (Erlangen, Germany, 10. March 2014 - 14. March 2014)
- Budday S., Kuhl E., Hutchinson JW.: Period-doubling and period-tripling in growing bilayered systems, *Philosophical Magazine* - (2015), p. 1-17, ISSN: 1478-6443
- Budday S., Steinmann P., Kuhl E.: Physical biology of human brain development, *Frontiers in Cellular Neuroscience* 9 (2015), p. 1-13, ISSN: 1662-5102
- Goriely A., Budday S., Kuhl E.: Chapter two-neuromechanics: From neurons to brain, *Advances in Applied Mechanics* 48 (2015), p. 79–139, ISSN: 0065-2156
- Budday S., Steinmann P., Kuhl E., Andres S.: Primary and secondary instabilities in soft bilayered systems, *GAMM Jahrestagung (Lecce), PAMM, Weinheim: 2015*
- Budday S., Steinmann P., Kuhl E.: Secondary instabilities modulate cortical complexity in the mammalian brain, *Philosophical Magazine* 95 (2015), p. 3244–3256, ISSN: 1478-6435
- Budday S., Steinmann P., Goriely A., Kuhl E.: Size and curvature regulate pattern selection in the mammalian brain, *Extreme Mechanics Letters* 4 (2015), p. 193-198, ISSN: 2352-4316
- Budday S., Sommer G., Birkl C., Langkammer C., Haybaeck J., Kohnert J., Bauer M., Paulsen F., Steinmann P., Kuhl E., Holzapfel GA.: Mechanical characterization of human brain tissue, *Acta Biomaterialia* 48 (2017), p. 319–340, ISSN: 1742-7061
- Budday S., Steinmann P.: On the influence of inhomogeneous stiffness and growth on mechanical instabilities in the developing brain, *International Journal of Solids and Structures* (2017), ISSN: 0020-7683, DOI: 10.1016/j.ijsolstr.2017.08.010
- Budday S., Andres S., Walter B., Steinmann P., Kuhl E.: Wrinkling instabilities in soft bi-layered systems, *Philosophical Transactions of the Royal Society A-Mathematical Physical and Engineering Sciences* 375 (2017), ISSN: 1364-503X, DOI: 10.1098/rsta.2016.0163
- Holland M., Goriely A., Budday S., Kuhl E.: Symmetry Breaking in Wrinkling Patterns: Gyri Are Universally Thicker than Sulci, *Physical Review Letters* 121 (2018), Article No.: 228002, ISSN: 0031-9007 DOI: 10.1103/PhysRevLett.121.228002
- Andres S., Steinmann P., Budday S.: The origin of compression influences geometric instabilities in bilayers, *Proceedings of the Royal Society A-Mathematical Physical and Engineering Sciences* (2018), ISSN: 1364-5021, DOI: 10.1098/rspa.2018.0267
- Budday S.: *The Role of Mechanics during Brain Development* (Dissertation, 2018)
URL: <https://opus4.kobv.de/opus4-fau/frontdoor/index/index/year/2018/docId/9298>
- Budday S., Ovaert T., Holzapfel GA., Steinmann P., Kuhl E.: Fifty Shades of Brain: A Review on the Mechanical Testing and Modeling of Brain Tissue, *Archives of Computational Methods in Engineering* 27 (2020), p. 1187–1230, ISSN: 1134-3060, DOI: 10.1007/s11831-019-09352-w