Curriculum Vitae

December 23, 2020

TOM WYLIE STROBERG

10-369 Donadeo Innovation Centre for Engineering
Department of Mechanical Engineering
University of Alberta
9211-116 Street NW, Edmonton, AB, T6G 1H9 Canada
(780) 492-9515 ✉ stroberg@ualberta.ca

RESEARCH INTERESTS

Multiscale modeling, systems biology, endoplasmic reticulum stress, macromolecular crowding mechanics.

EDUCATION

Ph.D. Theoretical & Applied Mechanics
Northwestern University, Evanston, IL, USA 2010 - 2016
Advisors: Prof. Seth Lichter & Prof. Wing Kam Liu
Thesis title: *Platelet Shape-Change Induced by Marginal Band Instability*

B.S. Mechanical Engineering
University of California, Berkeley, Berkeley, CA, USA 2006 - 2010

PROFESSIONAL APPOINTMENTS

Assistant Professor of Mechanical Engineering
University of Alberta, Edmonton, Alberta, Canada 2020 -

NIH Institutional Research and Academic Career Development Award (IRACDA) Postdoctoral Fellow
Molecular & Integrative Physiology
University of Michigan Medical School, Ann Arbor, MI, USA
Mentor: Prof. Santiago Schnell 2016 - 2020

PUBLICATIONS

PUBLISHED AND IN PRESS

[15] **W. Stroberg**, J. Eilertsen, S. Schnell. Information Processing by ER Stress Sensors. *Journal of the Royal Society Interface*, Vol. 16, Issue 158 (DOI: 10.1098/rsif.2019.0288).

[14] J. Eilertsen, **W. Stroberg**, S. Schnell, 2019. Completion, depletion or characterisitc timescales? An analysis of timescales in enzyme kinetics.*Journal of Theoretical Biology*, Vol. 48, pp 28-43. (DOI: 10.1016/j.jtbi.2019.01.005).

[13] **W. Stroberg**, H. Atkins, Y. Savir, S. Schnell, 2018. How to design an optimal sensor for the unfolded protein response. *Molecular Biology of the Cell*, Vol 29, pp 3052-3062. (DOI: 10.1091/mbc.E18-01-0060). (cover article)

[12] J. Eilertsen, **W. Stroberg**, S. Schnell, 2018. Phase-Plane Geometries in Coupled Enzyme Assays. *Mathematical Biosciences*, Vol. 306, pp 126-135. (DOI: 10.1016/j.mbs.2018.09.008).

[11] J. Eilertsen, **W. Stroberg**, S. Schnell, 2018. A theory of reactant-stationary kinetics for a mechanism of zymogen activation. *Journal of Biophysical Chemistry*, Vol. 242, pp 34-44. (DOI: 10.1016/j.bpc.2018.08.003).

[10] **W. Stroberg**, S. Schnell, 2018. Do cellular droplets accelerate biochemical reactions? Lessons from microdroplet chemistry. *Biophysical Journal*, Vol. 115, Issue 1, pp 3-8. (DOI: 10.1016/j.bpj.2018.05.023).

[9] C. Adams, **W. Stroberg**, R. DeFazio, S. Schnell, S. Moenter, 2017. Gonadotropin-releasing hormone (GnRH) neuron excitability is regulated by estradiol feedback and kisspeptin. *Journal of Neuroscience*, Vol. 38 (5), pp 1249-1263 (DOI: 10.1523/JNEUROSCI.2988-17.2017).

[8] **W. Stroberg**, S. Schnell, 2017. On the origin of non-membrane-bound organelles, and their physiological function. *Journal of Theoretical Biology*, Vol. 434, pp 42-49 (DOI: 10.1016/j.jtbi.2017.04.006).

[7] **W. Stroberg**, S. Schnell, 2017. On the validity and errors of the psuedo-first-order kinetics of ligand-receptor binding. *Mathematical Biosciences*, Vol. 287, pp 3-11 (DOI: 10.1016/j.mbs.2016.09.010).

[6] **W. Stroberg**, S. Schnell, 2016. On the estimation errors of KM and V from time-course experiments using the Michaelis-Menten equation. *Journal of Biophysical Chemistry*, Vol. 219, pp 17-27 (DOI: 10.1016/j.bpc.2016.09.004).

[5] J.A. Moore, Y. Li, D. O'Connor, **W. Stroberg**, W.K. Liu, 2015. Advancements in multiresolution analysis. *International Journal for Numerical Methods in Engineering*, Vol. 102, pp 784-807.

[4] Y. Li, **W. Stroberg**, T.R. Lee, H.S. Kim, H. Man, D. Ho, P. Decuzzi, W.K. Liu, 2013. Multiscale modeling and uncertainty quantification of nanoparticle-mediated drug/gene delivery. *Computational Mechanics*, Vol. 53, pp 511-537.

[3] **W. Stroberg**, S. Keten, W.K. Liu, 2012. Hydrodynamics of capillary imbibition under nanoconfinement. *Langmuir*, Vol. 28, No. 40, pp 14488-14495.

[2] W.K. Liu, T.R. Lee, A.M. Kopacz, H. Kim, **W. Stroberg**, H.B. Man, D. Ho, M.K. Kim, J.H. Chung, P. Decuzzi, 2011. Multiscale framework for biomedical simulation from molecular dynamics to continuum mechanics. *Journal of the Serbian Society for Computational Mechanics*, Vol. 5, No. 2, pp. 61-80.

[1] **T.W. Stroberg**, M. Manga, J. Dufek, 2010. Heat transfer coefficients of natural volcanic clasts. *Journal of Volcanology and Geothermal Research*, Vol. 194, Issue 4, pp. 214-219.

IN REVIEW

[17] **W. Stroberg**, S. Schnell, 2020. Concentration sensing in crowded environments. *Biophysical Journal*, in review.

[16] F. G. Centonze, A. Besse, V. Reiterer, **W. Stroberg**, M. Zahoor, L. Büchler, P. Mendoza-Garcia, M. Giliberto, K. Tasken, E. van Anken, C. Behrends, R. H. Palmer, S. Schnell, L. A. Munthe, C. Driessen, L. Besse, H. Farhan, 2020. Targeting Proteostasis in Multiple Myeloma through Inhibition of LTK. *EMBO Journal*, in review.

HONORS AND AWARDS

Outstanding Postdoctoral Fellow Award, University of Michigan, Ann Arbor 2018

Early-Stage Postdoctoral Award in Research Excellence,
Department of Molecular & Integrative Physiology, University of Michigan, Ann Arbor 2018

NIH IRACDA Fellowship, University of Michigan, Ann Arbor 2016 - 2019

Predictive Science and Engineering Design Cluster Fellowship, Northwestern University 2011 - 2012

Walter P. Murphy Fellowship, Northwestern University 2010

Frank Jarrett Machine Design Prize, University of California, Berkeley 2010

Pi Tau Sigma, Mechanical Engineering Honor Society, University of California, Berkeley 2008 - 2010

FUNDING

Current Support
University of Alberta Startup Funds. Role: Principle Investigator.
Total Funds: $110,000. 07/2020 - 07/2022

Past Support
NIH/NIGMS K12 GM111725 "Michigan IRACDA: Training Future Professors of Engineering and Physiology". Principle Investigators: David S. Sept and Bishr Omary, Role: Trainee (75% effort).
Total Funds: $5,212,203. Funding Portion: $147,040. 12/2016 - 12/2019

Submitted Grants
NSERC Discovery Grant "Understanding physical constraints on cell biology through multiscale modeling". Role: Principle Investigator. Total Funds: $555,500. 04/2021 - 04/2026

RESEARCH PRESENTATIONS

INVITED TALKS

[8] *Monitoring and Maintaining Homeostasis in the Endoplasmic Reticulum.* BIOMAT 2020 - 20th BIOMAT International Symposium, Rio de Janeiro, Brazil, November 5, 2020 (virtual).

[7] *Reverse Engineering Endoplasmic Reticulum Stress Sensors.* Marquette University Mechanical Engineering Graduate Semiar Series, Milwaukee, Wisconsin, United States, October 22, 2020 (virtual).

[6] *Reverse Engineering Endoplasmic Reticulum Stress Sensors.* Department of Mechanical Engineering, University of Alberta, Edmonton, Alberta, Canada, July 25, 2019.

[5] *How to Count Misfolded Proteins in the Endoplasmic Reticulum.* School of Mathematical Sciences, Rochester Institute of Technology, Rochester, New York, February 8, 2019.

[4] *Stress Sensing in the Endoplasmic Reticulum.* Quantitative Biology Seminar, University of Michigan, Ann Arbor, Michigan, United States, January 14, 2019.

[3] *How to Design an Optimal Sensor for ER Stress.* MIP Postdoctoral and Research Investigator Symposium, University of Michigan, Ann Arbor, Michigan, United States, May 16, 2018.

[2] *Microtubule Stability in Blood Platelet Formation and Activation.* Quantitative Biology Seminar, University of Michigan, Ann Arbor, Michigan, United States, February 8, 2016.

[1] *Water's Sensitivity to Confining Geometry Studied with Wang-Landau Monte-Carlo Simulations.* Gordon Research Seminar on Water and Aqueous Solutions, Holderness, New Hampshire, United States, July, 2014.

CONTRIBUTED TALKS

[10] W. Stroberg, S. Schnell, *Signaling and Sensing in the Crowded Cellular Milieu.* SIAM/CAIMS Annual Meeting, Toronto, Ontario, Canada, July 10, 2020 (virtual).

[9] W. Stroberg, S. Schnell, *Measuring concentrations in crowded environments.* Center for Multiscale Cell Fate Research 2nd Annual Symposium, Irvine, California, United States, October 15, 2019.

[8] W. Stroberg, J. Eilertsen, S. Schnell, *Information processing by ER stress sensors.* Annual Meeting for the Society of Mathematical Biology, Montreal, Quebec, Canada, July 23, 2019.

[7] W. Stroberg, S. Schnell, *Chemical sensing in crowded environments.* Telluride Science Research Center Workshop on Macromolecular Crowding, Telluride, Colorado, United States, July 18, 2019.

[6] W. Stroberg, J. Eilertsen, S. Schnell, *Information processing by ER stress sensors.* SIAM Great Lakes Conference, Ann Arbor, Michigan, United States, April 27, 2019.

[5] W. Stroberg, S. Schnell, *How to design an optimal sensor for the unfolded protein response.* Mathematical Biology at Institute Mittag-Leffler, Stockholm, Sweden, October 12, 2018.

[4] W. Stroberg, S. Schnell, *Information transmission and adaptivity in ER stress sensing.* Annual q-Bio Conference (poster spotlight), New Brunswick, New Jersey, United States, July 27, 2017.

[3] W. Stroberg, W.K. Liu, S. Lichter, *Microtubule buckling in platelet morphogenesis.* United States National Congress on Computational Mechanics, San Diego, California, United States, July 28, 2015.

[2] W. Stroberg, W. K. Liu, S. Lichter, *Microtubule-driven conformational changes in platelet morphogenesis.* Society of Engineering Science, Purdue University, West Lafayette, Indiana, United States, October 2, 2014.

[1] T.W. Stroberg, S. Keten, W. K. Liu, *Water-nanotube solution undergoing capillary suction: coarse-grained molecular dynamics simulations.* United States National Congress on Computational Mechanics, Minneapolis, Minnesota, United States, July 27, 2011.

POSTERS

[7] W. Stroberg, J. Eilertsen, S. Schnell, *Information processing by ER stress sensors.* IRACDA Annual Conference, Ann Arbor, Michigan, United States, July 1, 2019.

[6] W. Stroberg, H. Aktin, Y. Savir, S. Schnell, *Optimal sensory network for the unfolded protein response.* Annual q-Bio Conference, Houston, Texas, United States, June 28, 2018.

[5] W. Stroberg, S. Schnell, *Accurate parameterization of the Michaelis-Menten equation from time-course experiments.* IRACDA Annual Conference, Birmingham, Alabama, United States, June 5, 2017.

[4] W. Stroberg, S. Schnell, *Accurate parameterization of the Michaelis-Menten equation from time-course experiments.* JIMB Metrology Day Symposium, Stanford, California, United States, May 22, 2017.

[3] W. Stroberg, W. K. Liu, S. Lichter, *Microtubule-driven conformational changes in platelet morphogenesis.* Biophysical Society 59th Annual Meeting, Baltimore, Maryland, United States, February 10, 2015.

[2] W. Stroberg, W. K. Liu, S. Lichter, *Water's sensitivity to confining geometry studied with Wang-Landau Monte-Carlo simulations.* Gordon Research Conference on Water and Aqueous Solutions, Holderness, New Hampshire, United States, July 29, 2014.

[1] T.W. Stroberg, M. Manga, J. Dufek, *Heat transfer coefficients for natural volcanic particles and laboratory studies.* American Geophysical Union Fall Meeting, San Francisco, California, United States, December, 2009.

SCIENCE OUTREACH

[3] *Mathematical Biology: Life as a Dry Scientist*, Wayne County Community College, Detroit, Michigan, April, 2018.

[2] *Biology and Physiology from an Engineer's Perspective*, Henry Ford College, Dearborn, Michigan, November, 2017.

[1] *At the Intersection of Engineering and Biology*, Henry Ford College, Dearborn, Michigan, April, 2017.

MENTORING ACTIVITIES

University of Alberta

Zobayer Hossein, (MSc in Mechanical Engineering). 09/2020 -
Thesis Topic: Molecular simulation and coarse-graining of ER-stress sensing protein IRE1.

University of Michigan

Aleesa Monaco, (visiting undergraduate from Arizona State University) 06/2018 - 09/2018
Project: The effect of polyphosphate on protein aggregation kinetics.

Wala Sailan, (visiting undergraduate from Henry Ford College) 06/2018 - 09/2018
Project: Investigation of bifurcations in a model of the unfolded protein response.

Zenny Chu, (visiting undergraduate from Johns Hopkins University) 06/2017 - 09/2017
Project: Modeling the influence of polyphoshate on protein aggregation.

Adam Siedlik, (visiting undergraduate from Henry Ford College) 06/2017 - 09/2017
Project: Effect of unknown parameters in systems biology modeling.

Alexis Grebenok, (visiting undergraduate from Canisius College) 06/2016 - 09/2016
Project: Uncertainty in parameter estimates from enzyme assays.

Dissertation Committees

Aarat Kalra (PhD in Physics), "AllWired Up: An Exploration of the Electrical Properties of Microtubules and Tubulin", Department of Physics, University of Alberta.
Role: Arms-Length Examiner. 12/2020

Mark James Sherstan (MSc in Mechanical Engineering), "Localization and Control of a Quadcopter Universal Payload System", Department of Mechanical Engineering, University of Alberta. Role: Chair. 12/2020

ACADEMIC VISITS

NSF-Simons Center for Multiscale Cell Fate Research 2019-2020
University of California, Irvine, Irvine, CA, USA (Duration 8 months)

Institute Mittag-Leffler 2018
Royal Swedish Academy of Sciences, Djursholm, Sweden (Duration 2 weeks)

TEACHING EXPERIENCE

Henry Ford College, Dearborn, MI, USA

Spring	2018	Instructor of Record, Dynamics (ENGR 233)
Fall	2017	IRACDA Teaching Fellow, Cell & Molecular Biology (BIO 153)
Spring	2017	IRACDA Teaching Fellow, Dynamics (ENGR 233)

University of Michigan, Ann Arbor, Ann Arbor, MI, USA

Winter	2017	Guest Lecturer, Computational Systems Biology in Physiology (PHYSIOL 520)
Winter	2016	Guest Lecturer, Computational Systems Biology in Physiology (PHYSIOL 520)

Northwestern University, Evanston, IL, USA

Spring	2014	Lead Teaching Assistant, Engineering Analysis III (ENG 205)
Spring	2013	Lead Teaching Assistant, Engineering Analysis III (ENG 205)
Fall	2012	Teaching Assistant, Finite Element Method for Stress Analysis (ME 327)

PEDAGOGICAL TRAINING

2017 - Present	Organizer of IRACDA Pedogogy Journal Club, University of Michigan, Ann Arbor.
2018	Postdoctoral Short Course on College Teaching in Science and Engineering, University of Michigan, Ann Arbor.

PROFESSIONAL SERVICE

Ad-hoc Referee: Physical Biology, Nature Scientific Reports, Nucleic Acids Research, PLOS Computation Biology, Physical Chemistry and Chemical Physics, Journal of the Royal Society Interface, Journal of Biotechnology, Mathematical Biosciences, Computational Mechanics, International Journal of Numerical Methods in Engineering

Memberships

Society for Industrial and Applied Mathematics	2018-
Society for Mathematical Biology	2018-
Biophysical Society	2014-

PRESS RELEASES

How Do Cells Under Stress Clean Up a Potentially Dangerous Mess? Researchers develop a mathematical model of a cell's response to disease-causing unfolded proteins., Michigan Medicine Health Lab, December 5, 2018. https://labblog.uofmhealth.org/lab-report/how-do-cells-under-stress-clean-up-a-potentially-dangerous-mess