

Joseph D Peterson

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EDUCATION

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|-----------------------------|---|-------------|---------|
| • Postdoctoral Studies | University of Cambridge, UK | (2019 –) | |
| • Chemical Engineering, PhD | University of Santa Barbara, CA. | (2013 – 18) | GPA 3.9 |
| | <i>Advisors: Gary Leal, Glenn Fredrickson</i> | | |
| • Chemical Engineering, BS | University of Minnesota, Twin Cities. | (2011 – 13) | GPA 3.7 |
| • Applied Mathematics, BS | Northwestern College | (2008 – 11) | GPA 3.9 |

RESEARCH INTERESTS

- Soft matter and complex fluids
- Nonlinear dynamics of biological systems

TEACHING EXPERIENCE

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|-----------------|--|------|
| • Co-instructor | Numerical Methods for Chemical Engineers (undergraduate) | 2016 |
| • Reader | Advanced Transport Phenomena (graduate) | 2015 |
| • Reader | Thermodynamics | 2014 |
| • Private Tutor | Undergraduate Chemical Engineering (ESTEEM program) | 2015 |

INDUSTRY EXPERIENCE

- 3M Company, Technical Aide (2010 – 2012) and Intern (2013), Safety and Graphics Laboratory
 - Schlieren Imaging – designed and operated flow visualization equipment
 - Nonwovens – testing new product ideas at pilot scale and lab scale
 - Filled polymers – testing new product ideas at pilot scale and lab scale
- Postdoctoral scholar at University of Cambridge, funded by Unilever Corporation
 - Wormlike Micelles – constitutive models for formulation and processing
 - Dense Emulsions – constitutive equations for emulsification

HONORS

- Best presentation, UCSB graduate student symposium (2017)
- CSP teacher/scholar fellowship (2016)
- Heslin Fellowship (2013)
- Dow Outstanding Junior Award (2012)
- Northwestern College Honors Scholarship (2008 – 2011)

PUBLIC OUTREACH

- St. Lawrence Primary School (Cambridge UK), Origami Club, 2019 - 2020

PUBLICATIONS

- **Peterson, J. D.**, M. Cromer, G. H. Fredrickson, and L. G. Leal. "Shear banding predictions for the two-fluid Rolie-Poly model." *Journal of Rheology* 60.5 (2016): 927-951.
- **Peterson, J. D.**, G. H. Fredrickson, and L. G. Leal. "Does shear induced demixing resemble a thermodynamically driven instability?" *Journal of Rheology* 63.2 (2019): 335-359.
- Boudara, V., **J. D. Peterson**, L. G. Leal, and D. J. Read. "Nonlinear rheology of polydisperse blends of entangled linear polymers: Rolie-Double-Poly models." *Journal of Rheology* 63.1 (2019): 71-91.
- **Peterson, J. D.**, G. H. Fredrickson, and L. G. Leal. "Shear Induced Demixing in Bidisperse and Polydisperse Polymer Blends: Predictions From a Multi-Fluid Model." accepted for publication, *Journal of Rheology* (2020)
- L. T. Andriano et. al. "Microstructural characterization of a star-linear polymer blend under shear flow by using rheo-SANS", *Journal of Rheology* 64 (2020)
- Gillissen, J.J., C. Ness, **J.D. Peterson**, H. J. Wilson, and M. E. Cates. "Constitutive model for time-dependent flows of shear-thickening suspensions. *Physical Review Letters*, 123.21 (2020)
- Gillissen, J. J. J., C. Ness, **J. D. Peterson**, H. J. Wilson, and M. E. Cates. "Constitutive model for shear-thickening suspensions: Predictions for steady shear with superposed transverse oscillations." *Journal of Rheology* 64.2 (2020): 353-365.
- **Peterson, J. D.** and M. E. Cates, "A full-chain tube-based constitutive model for living linear polymers." accepted for publication, *Journal of Rheology* (2020)
- **Peterson, J. D.** and M. E. Cates, "Constitutive Models for Living Polymers Beyond the fast-breaking Limit", pending approval from industry sponsor for submission to *Journal of Rheology*.
- Adhikari, R., et al. "Inference, prediction and optimization of non-pharmaceutical interventions using compartment models: the PyRoss library." arXiv preprint arXiv:2005.09625 (2020).
- **Peterson, J. D.** and R. Adhikari, "Efficient and flexible methods for time since infection models." arXiv preprint [**link when available**]

PAPERS IN PREPARATION

- **Peterson, J. D.** and L. G. Leal. "Flow-Induced Scission in Wormlike Micelles: The Living Rolie Poly Model".
- Guioth, J., **J. D. Peterson**, and R. Adhikari. "Inference and forecasting for epidemic models with time since infection"
- Mu, J. et al, "Characterisation of worm-like micelles and their correlation with the viscosity of polydisperse surfactant solutions"

RESEARCH TALKS (CONFERENCES)

- "A population balance model for the non-linear rheology of well entangled wormlike micelles", Joseph Peterson, Mike Cates, Condensed Matter Physics Seminar, Durham University July 2020
- "Predictions for the Linear and non-linear rheology of living Rolie Poly polymers", Joseph Peterson, L. Gary Leal, Invited talk, INNFM 2019, Lake Vyrnwy, Wales.
- "A simple constitutive model for polymer blends: Predictions and experimental comparisons for viscometric and non-viscometric flows," Joseph D. Peterson, Victor Boudara, Daniel J. Read, Chandi Sasmal, and L. Gary Leal. [SOR 2018](#), Houston, TX.
- "Predictions for non-linear flows of polydisperse blends from a differential-constitutive double reptation model," Joseph Peterson, L. Gary Leal, Glenn H. Fredrickson, [AIChE 2017](#), Minneapolis

- “Shear induced demixing in large amplitude oscillatory shear flows,” Joseph D. Peterson, L. Gary Leal. [AICHE 2016](#), San Francisco.
- “Predictions of flow-induced demixing and shear banding in polydisperse polymer melts,” Joseph D. Peterson, L. Gary Leal, Glenn H. Fredrickson, [SOR 2017](#), Denver
- “Flow Induced Inhomogeneity for a Polymer Solution in Oscillatory Shear Flow”, Joseph D. Peterson, L. Gary Leal. International Conference on Theoretical and Applied Mechanics 2016, Montreal, Canada. (Abstract and proceedings available upon request)
- “Theoretical Studies of Shear Banding in Polymer Solutions,” Joseph D. Peterson, Michael Cromer, Glenn H. Fredrickson, and L. Gary Leal. International Congress on Rheology 2016, Kyoto, Japan.

RESEARCH TALKS (RECORDED)

- “Modelling polymer blends in flow,” Joseph D. Peterson, Glenn H. Fredrickson, L. Gary Leal. [Thesis defense](#) (2018). <https://bit.ly/2IRJPMf>
- “Two-fluid models for polymer melts and solutions,” Joseph D. Peterson, Glenn H. Fredrickson, L. Gary Leal. [KITP](#) dense suspensions workshop (2018). (talk begins at 1:00:58) <https://bit.ly/2xe7OF1>

REFERENCES

- Dr. Gary Leal, Professor of Chemical Engineering, UCSB (primary advisor, PhD). lg120@engineering.ucsb.edu
- Dr. Glenn Fredrickson, Professor of Chemical Engineering, UCSB (secondary advisor, PhD). ghf@mrl.ucsb.edu
- Dr. Mike Cates, Lucasian Professor of Mathematics, University of Cambridge (postdoc supervisor). m.e.cates@damtp.cam.ac.uk
- Dr. Ronjoy Adhikari, Faculty of Mathematics, University of Cambridge (RAMP supervisor) ra413@damtp.cam.ac.uk