

Joseph D Peterson

DAMTP, University of Cambridge
CMS, Wilberforce Rd, Cambridge UK, CB3-0WA

(44) 0785 885 3664
jp838@cam.ac.uk

ACADEMIC HISTORY

- Postdoctoral Researcher University of Cambridge, DAMPT (2019 –)
Mike Cates, Ronjoy Adhikari
Wormlike micelles, dense suspensions/emulsions
- Chemical Engineering, PhD University of Santa Barbara, CA. (2013 – 18) GPA 3.9
Gary Leal, Glenn Fredrickson
Shear induced demixing, polymer blend rheology
- 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 and biosystems engineering

TEACHING EXPERIENCE

- 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 researcher at University of Cambridge, 75% funded by Unilever PLC
 - 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. Laurence Primary School (Cambridge UK), Origami Club, 2019 - 2020

PUBLICATIONS

- [11] **Peterson, J. D.** and R. Adhikari, “Efficient and flexible methods for time since infection models.” arXiv preprint [**link when available**]
- [10] Adhikari, R., et al. "Inference, prediction and optimization of non-pharmaceutical interventions using compartment models: the PyRoss library." arXiv preprint arXiv:2005.09625 (2020).
- [9] **Peterson, J. D.** and M. E. Cates, “Constitutive Models for Living Polymers Beyond the fast-breaking Limit”, under internal review at Unilever PLC, for submission to the Journal of Rheology
- [8] **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)
- [7] **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." Journal of Rheology 64 (2020)
- [6] Andriano, L.T., N. Ruocco, **J. D. Peterson**, D. Olds, M. E. Helgeson, K. Ntetsikas, N. Hadjichristidis, S. Costanzo, D. Vlassopoulos, R. P. Hjelm, and L. G. Leal, “Microstructural characterization of a star-linear polymer blend under shear flow by using rheo-SANS”, Journal of Rheology 64 (2020)
- [5] 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.
- [4] 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)
- [3] **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.
- [2] 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.
- [1] **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.

PAPERS IN PREPARATION

- [14] Mu, J., C. P. Cabry, **J. D. Peterson**, S. C. De Hert, L. Morrison, C. Avedano, I. P. Stott, J. L. Cook, A. J. Masters, and C. Hardacre. “Characterisation of worm-like micelles and their correlation with the viscosity of polydisperse surfactant solutions”
- [13] Guioth, J., **J. D. Peterson**, and R. Adhikari. “Inference and forecasting for epidemic models with time since infection”
- [12] **Peterson, J. D.** and L. G. Leal. "Flow-Induced Scission in Wormlike Micelles: The Living Rolie Poly Model”, for submission to the Journal of Rheology

RESEARCH TALKS (CONFERENCES)

- [8] “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
- [7] “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.
- [6] “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.
- [5] “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
- [4] “Predictions of flow-induced demixing and shear banding in polydisperse polymer melts,” Joseph D. Peterson, L. Gary Leal, Glenn H. Fredrickson, [SOR 2017](#), Denver
- [3] “Shear induced demixing in large amplitude oscillatory shear flows,” Joseph D. Peterson, L. Gary Leal. [AICHE 2016](#), San Francisco.
- [2] “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)
- [1] “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)

- [2] “Modelling polymer blends in flow,” Joseph D. Peterson, Glenn H. Fredrickson, L. Gary Leal. [Thesis defense](#) (2018). <https://bit.ly/2SSXNrX>
- [1] “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/2xe7OFI>

REFERENCES

- Dr. Gary Leal, Professor of Chemical Engineering, UCSB (primary advisor, PhD). lgl20@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