Stanford

Louis Durlofsky

Otto N. Miller Professor in the School of Earth Sciences

Energy Science & Engineering

Curriculum Vitae available Online

Bio

ACADEMIC APPOINTMENTS

- Professor, Energy Science & Engineering
- Affiliate, Precourt Institute for Energy
- Affiliate, Stanford Woods Institute for the Environment

ADMINISTRATIVE APPOINTMENTS

- Post-Doctoral Fellow, California Institute of Technology, Pasadena, California, (1986-1987)
- Various positions, Chevron Petroleum Technology Company, La Habra, California, (1987-1999)
- Associate Professor (Research) of Petroleum Engineering, Stanford University, (1998-2001)
- Senior Staff Research Scientist, Reservoir Simulation Research Team, Chevron Energy Technology Company, San Ramon, California, (1999-2004)
- Associate Professor of Petroleum Engineering, Stanford University, (2001-2003)
- Professor of Petroleum Engineering / Professor of Energy Resources Engineering, Stanford University, (2003- present)
- Chair, Department of Energy Resources Engineering, Stanford University, (2006-2012)

HONORS AND AWARDS

- Member, National Academy of Engineering, National Academy of Engineering (2022)
- Best Paper Award (for year 2014), Mathematical Geosciences (2016)
- IBM Faculty Award, IBM (2013)
- Best Paper Award (for year 2008), Mathematical Geosciences (2009)
- Otto N. Miller Chair in Earth Sciences, Stanford University (2009)
- SPE Distinguished Member, Society of Petroleum Engineers (2007)
- SPE Lester C. Uren Award (for distinguished achievement before age 45), Society of Petroleum Engineers (2007)
- SPE Outstanding Technical Editor Award, SPE Journal (2004)
- SPE Reservoir Engineering Award, Society of Petroleum Engineers (2002)
- School of Earth Sciences Excellence in Teaching Award, Stanford University (2001)
- Chevron Corporation Chairman's Award, Chevron (1999)
- Chevron Petroleum Technology Company R&D Award, Chevron Petroleum Technology Company (1995)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Co-taught Reservoir Simulation Short Course, July, Stanford University (2018 - 2018)

- External review committee member, Pennsylvania State University Petroleum and Natural Gas Engineering (PNGE) Program, Penn State (2018 - 2018)
- Invited speaker, Penn State (2018 - 2018)
- Invited speaker, SIAM Conference on Uncertainty Quantification, Garden Grove, CA, SIAM (2018 - 2018)
- Co-organizer, IPAM Long Program on Computational Issues in Oil Field Applications, UCLA IPAM (2017 - 2017)
- Co-taught Reservoir Simulation Short Course, July, Stanford University (2017 - 2017)
- Guest co-editor, of Special Issue of Mathematical Geosciences on Smart Oil Fields and Mining Complexes, Mathematical Geosciences (2017 - 2017)
- Invited speaker, ExxonMobil Upstream Research Company, Houston, TX (2017 - 2017)
- Invited speaker, IPAM Workshop on Multiphysics, Multiscale, and Coupled Problems in Subsurface Physics, UCLA IPAM. Los Angeles, CA (2017 - 2017)
- Invited speaker, IPAM Workshop on Data Assimilation, Uncertainty Reduction, and Optimization for Subsurface Flow, UCLA IPAM (2017 - 2017)
- Invited speaker, SPE Workshop: Learning from Reservoir Response – History Matching and Data Analytics, Austin TX, SPE (2017 - 2017)
- Invited speaker, West Coast Reduced-Order Modeling Workshop, Lawrence Berkeley National Laboratory (2017 - 2017)
- Co-taught Reservoir Simulation Short Course, July, Stanford University (2016 - 2016)
- Invited speaker, InterPore Conference, Cincinnati, OH, InterPore (2016 - 2016)
- Invited speaker, Workshop on Numerical Optimization for Application in Reservoir Management, Utrecht, The Netherlands, TNO (2016 - 2016)
- External review committee member, Geo-cluster, TU Delft, The Netherlands (2015 - 2016)
- Co-taught Reservoir Simulation Short Course, July, Stanford University (2015 - 2015)
- Invited speaker, Chevron Energy Technology Company, Houston (2015 - 2015)
- Invited speaker, West Coat ROM Workshop, Sandia National Laboratories, Livermore, CA (2015 - 2015)
- Invited speaker, Zandmer Distinguished Lecture Series (2 talks), University of Calgary, Alberta, Canada (2015 - 2015)
- Editorial Board, Mathematical Geosciences (2014 - present)
- Co-taught Reservoir Simulation Short Course, August, Stanford University (2014 - 2014)
- Invited speaker, AGU Annual Meeting, San Francisco, AGU (2014 - 2014)
- Invited speaker, IFORS (International Federation of Operational Research Societies), Barcelona, Spain, IFORS (2014 - 2014)
- Invited speaker, InterPore Conference, Milwaukee, WI, InterPore (2014 - 2014)
- Invited speaker, Schlumberger Applied Mathematics Workshop (Webinar), Schlumberger, UK (2014 - 2014)
- Co-taught Reservoir Simulation Short Course, August, Stanford University (2013 - 2013)
- Invited speaker, Petroleum & Geosystems Engineering Department Seminar, March, University of Texas, Austin (2013 - 2013)
- Invited speaker, Petroleum Engineering Seminar Series, April, University of Houston (2013 - 2013)
- Invited speaker, Petroleum Engineering, October, Norwegian University of Science and Technology, Trondheim, Norway (2013 - 2013)
- Invited speaker, Schlumberger Applied Math Global Webinar, March, Schlumberger (2013 - 2013)
- Keynote speaker, International Conference on Nonlinearities and Upscaling in Porous Media, October, NUPUS, Os, Norway (2013 - 2013)
- Member of School of Earth Sciences Core Council, Stanford University (2012 - present)
- Co-taught Reservoir Simulation Short Course, July, Stanford University (2012 - 2012)
- Invited speaker, InterPore Conference, Purdue University, West Lafayette, IN, May, InterPore (2012 - 2012)
- Editorial Board, Computational Geosciences (2011 - present)
- Associate Editor, SIAM Multiscale Modeling and Simulation, Society for Industrial and Applied Mathematics (2011 - 2014)
- Co-taught Reservoir Simulation Short Course, July, Stanford University (2011 - 2011)
- Invited speaker, CENPES, Petrobras, Rio de Janeiro, Brazil, June, Petrobras (2011 - 2011)

- Invited speaker, NSF-SIAM Workshop on Collaboration in Mathematical Geosciences, Washington DC, September, NSF-SIAM (2011 - 2011)
- Invited speaker, Petroleum and Geological Engineering Department Seminar, October, University of Oklahoma (2011 - 2011)
- Invited speaker, Thermal and Fluid Sciences Affiliates Meeting - Optimization Day, February, Stanford University (2011 - 2011)
- Invited speaker, Workshop on Large-scale Inverse Problems and Quantification of Uncertainty, Institute of Mathematics and its Applications (IMA), University of Minnesota (2011 - 2011)
- Minisymposium co-organizer, SIAM Conference on Mathematical and Computational Issues in the Geosciences, Long Beach, CA, March, Society for Industrial and Applied Mathematics (2011 - 2011)
- Plenary speaker, Workshop on Geomechanics and Numerical Methods for Reservoir Simulation, LNCC, Petropolis, Brazil, June, LNCC (2011 - 2011)
- Co-Director, Stanford Smart Fields Consortium, Stanford University (2010 - present)
- Co-taught Reservoir Simulation Short Course, July, Stanford University (2010 - 2010)
- Invited speaker, 2nd International Conference on Engineering Optimization, Lisbon, Portugal, September, EngOpt (2010 - 2010)
- Invited speaker, InterPore Conference and Annual Meeting, Texas A&M University, College Station, TX, March, InterPore (2010 - 2010)
- Invited speaker, London Mathematical Society Durham Research Symposium – Numerical Analysis of Multiscale Problems, Durham University, Durham, UK, July, London Mathematical Society (2010 - 2010)
- Invited speaker, Petroleum Engineering Department Seminar, College Station, October, Texas A&M University, (2010 - 2010)
- Co-organizer and Participant, Fueling the Future Panel Discussion, Stanford, January, Stanford University (2009 - 2009)
- Co-taught Reservoir Simulation Short Course, Stanford, July, Stanford University (2009 - 2009)
- Invited speaker, Reservoir Engineering Research Institute, Palo Alto, CA, May, Reservoir Engineering Research Institute (2009 - 2009)
- Invited speaker, SPE Golden Gate Section, San Ramon, CA, May, Society of Petroleum Engineers (2009 - 2009)
- Co-taught Reservoir Simulation Short Course, Stanford, July, Stanford University (2008 - 2008)
- Invited speaker, Distinguished Speaker Series in Computation for Design and Optimization, MIT, December, MIT (2008 - 2008)
- Invited speaker, SIAM Conference on Optimization, Boston, May, Society for Industrial and Applied Mathematics (2008 - 2008)
- Invited speaker, SPE Applied Technology Workshop on Closed-loop Reservoir Management, Bruges, Belgium, June, Society of Petroleum Engineers (2008 - 2008)
- Invited speaker, SPE Colloquium on Petroleum Engineering Education, Houston, January, Society of Petroleum Engineers (2008 - 2008)
- Invited speaker, Schlumberger-Doll Research, Cambridge, MA, December, Schlumberger-Doll (2008 - 2008)
- Minisymposium co-organizer, SIAM Conference on Optimization, Boston, May, Society for Industrial and Applied Mathematics (2008 - 2008)
- Co-taught Reservoir Simulation Short Course, Stanford, August, Stanford University (2007 - 2007)
- Invited speaker, Applied Computational Intelligence Laboratory, Pontifícia Universidade Católica do Rio de Janeiro, Brazil, August, Applied Computational Intelligence Laboratory (2007 - 2007)
- Invited speaker, CENPES, Petrobras, Rio de Janeiro, Brazil, August, Petrobras (2007 - 2007)
- Invited speaker, Foundation CMG Technical Symposium, Calgary, Canada, September, Foundation CMG (2007 - 2007)
- Invited speaker, Mathematics and Engineering Seminar, Texas Tech University, Lubbock, TX, February, Texas Tech University (2007 - 2007)
- Invited speaker, Occidental of Elk Hills, Bakersfield, CA, September, Occidental (2007 - 2007)
- Invited speaker, Petroleum & Geosystems Engineering Department Seminar, September, University of Texas, Austin, (2007 - 2007)
- Invited speaker, Petroleum Engineering Department Seminar, Baton Rouge, October, Louisiana State University (2007 - 2007)
- Invited speaker, Petroleum Engineering Department Seminar, University of Tulsa, OK, February, University of Tulsa (2007 - 2007)
- Invited speaker, Smart Fields Roundtable, Petrobras, Rio de Janeiro, Brazil, August, Petrobras (2007 - 2007)
- Invited speaker, US Baseline Workshop on Simulation Based Engineering and Science, Arlington, VA, November, World Technology Evaluation Center (2007 - 2007)
- Invited speaker, Uncertainty Modeling and Quantification in Computational Mechanics, Ann. Mtg, San Francisco, July, US National Congress on Computational Mechanics (2007 - 2007)
- Upscaling Short Course, Occidental of Elk Hills, Bakersfield, CA, September, Occidental (2007 - 2007)

- Co-taught Reservoir Simulation Short Course, August, Stanford University (2006 - 2006)
- Guest co-editor, Special Issue on Closed-loop Reservoir Management, Computational Geosciences (2006 - 2006)
- Invited speaker, 7th World Congress, Los Angeles, July, Computational Mechanics, Mathematical and Computational Aspects of Multi-scale and Multi-physics (2006 - 2006)
- Invited speaker, CNODC, Beijing, China, November, China National Oil & Gas Exploration Development (2006 - 2006)
- Invited speaker, China University of Petroleum, Beijing, China, November, China University of Petroleum (2006 - 2006)
- Invited speaker, ConocoPhillips, Houston, June, ConocoPhillips (2006 - 2006)
- Invited speaker, Data Assimilation in Computational Mechanics, Ann. Mtg. Los Angeles, July, World Congress on Computational Mechanics (2006 - 2006)
- Invited speaker, Geophysics Department Seminar, June, Stanford University (2006 - 2006)
- Invited speaker, Research Institute of Petroleum Exploration and Development (RIPED), PetroChina, Beijing, China, November, RIPED (2006 - 2006)
- Keynote speaker, Marathon Oil Company Upscaling Symposium, Houston, July, Marathon Oil Company (2006 - 2006)
- Keynote speaker, Quantitative Methods for Reservoir Characterization, Institut Francais du Petrole, Paris, France, April, Institut Francais du Petrole (2006 - 2006)
- Chair of Technical Committee, SPE Advanced Technology Workshop on Modeling and Optimization of Smart Wells, Huntington Beach, CA, April, Society of Petroleum Engineers (2005 - 2005)
- Co-taught Reservoir Simulation Short Course, August, Stanford University (2005 - 2005)
- Interim Department Chair, Energy Resources Engineering, Stanford University (2005 - 2005)
- Invited speaker, Computer Modeling Group, Calgary, Canada, March, Computer Modeling Group (2005 - 2005)
- Invited speaker, Eni E&P, Milan, Italy, June, Eni E&P (2005 - 2005)
- Invited speaker, Workshop on Integrative Multiscale Modeling and Simulation in Materials Science, Fluids and Environmental Science, Universite de Montreal, Canada, May, Universite de Montreal, (2005 - 2005)
- Keynote speaker, 8th International Forum on Reservoir Simulation, Stresa, Italy, June, International Forum on Reservoir Simulation (2005 - 2005)
- Member, Graduate Admissions Committee, Petroleum Engineering, Stanford University (2005 - 2005)
- School of Earth Sciences Academic Programs Committee (EEES), Stanford University (2004 - 2006)
- Chair, Graduate Admissions Committee, Petroleum Engineering, Stanford University (2004 - 2004)
- Co-organizer, Delft-Stanford Workshop on Closed-Loop Reservoir Management, Delft, Netherlands, June, Delft and Stanford Universities (2004 - 2004)
- Co-taught Reservoir Simulation Short Course, Stanford, August, Stanford University (2004 - 2004)
- Invited speaker EAGE Workshop on Scale Changes in Shared Earth Models, Paris, France, June, European Association of Scientists and Engineers (2004 - 2004)
- Invited speaker, AGU Annual Meeting, San Francisco, December, American Geophysical Union (2004 - 2004)
- Invited speaker, BG Group, Reading, UK, June, BG Group (2004 - 2004)
- Invited speaker, Department of Mathematics, University of Bergen, Norway, October, University of Bergen (2004 - 2004)
- Invited speaker, Department of Petroleum and Geosystems Engineering, University of Texas, September, University of Texas (2004 - 2004)
- Invited speaker, Gaz de France, Paris, France, June, Gaz de France (2004 - 2004)
- Invited speaker, Institut Francais du Petrole, Paris, France, June, Institut Francais du Petrole (IFP) (2004 - 2004)
- Invited speaker, Institute for Scientific Computation, Texas A&M University, August, Institute for Scientific Computation (2004 - 2004)
- Invited speaker, SPE Advanced Technology Workshop on Improved Reservoir Physics, San Diego, CA, April, Society of Petroleum Engineers (2004 - 2004)
- Invited speaker, Workshop on Multiscale Modeling for Fluid Flow and Material Science, University of Oslo, Norway, October, University of Oslo (2004 - 2004)
- School of Earth Sciences Core Disciplines Committee, Stanford University (2003 - 2004)

- Co-organizer, Heriot-Watt - Stanford Reservoir Description and Modeling Forum, Peebles, UK, September, Heriot-Watt - Stanford Modeling Forum, (2003 - 2003)
- Co-taught Short Course on Reservoir Simulation, August, Stanford University (2003 - 2003)
- Invited Speaker and Session Chair, SPE Forum on Reservoir Simulation, Park City, UT, July, Society of Petroleum Engineers (2003 - 2003)
- Invited Speaker, Ecole Nationale Superieure de Geologie, Nancy, France, October, Ecole Nationale Superieure de Geologie (2003 - 2003)
- Invited Speaker, Geophysics Department Seminar, May, Stanford University (2003 - 2003)
- Invited Speaker, SIAM Conference on Mathematical and Computational Issues in the Geosciences, Austin, TX, March, Society for Industrial and Applied Mathematics (2003 - 2003)
- Invited Speaker, Total, Pau, France, October, Total (2003 - 2003)
- Member of Technical Committee, SPE Reservoir Simulation Symposium, Febrary, Society of Petroleum Engineers (2003 - 2003)
- Mini-symposium co-organizer, SIAM Geosciences Conference, Austin, TX, March, Society for Industrial and Applied Mathematics (2003 - 2003)
- Permanent Member of the Scientific Committee, European Conference on the Mathematics of Oil Recovery (2002 - present)
- Co-organizer and Invited Speaker, Institute of Mathematics and its Applications Workshop on Quantifying Uncertainty and Multiscale Phenomena in Subsurface Processes, Minneapolis, January, Institute of Mathematics (2002 - 2002)
- Guest Editor, Special Issue on Upscaling, Computational Geosciences (2002 - 2002)
- Invited Speaker, Dept. of Mathematics, University of Bergen (Norway), University of Bergen (2002 - 2002)
- Invited Speaker, Institute of Mathematics and its Analysis Workshop on Numerical Methods in the Geosciences, Minneapolis, MN, Institute of Mathematics (2002 - 2002)
- Keynote Speaker, Reservoir Simulation Forum, BHP-Billiton, Houston, TX, Reservoir Simulation Forum (2002 - 2002)
- Chairman of Technical Committee, 2001 SPE Reservoir Simulation Symposium, Society of Petroleum Engineers (2001 - 2001)
- Session Chair, Stanford/Heriot-Watt Reservoir Modeling Forum, Carmel, CA, Stanford/Heriot-Watt Reservoir Modeling Forum (2001 - 2001)
- Short course on Reservoir Simulation, Petroleum Engineering Department, Stanford University (2001 - 2001)
- Co-Director, Stanford Reservoir Simulation Affiliates Program (SUPRI-B), Stanford University (2000 - present)
- Invited Speaker, Environmental Fluid Mechanics and Hydrology Seminar, Civil and Environmental Engineering, Stanford University (2000 - 2000)
- Invited Speaker, First SIAM Conference on Computational Science and Engineering, Washington, D.C., Society of Industrial and Applied Mathematics (2000 - 2000)
- Invited Speaker, Gordon Research Conference on Modeling Flow in Permeable Media, Andover, NH, Gordon Research Conference (2000 - 2000)
- Invited Speaker, Waseda University, Tokyo, Japan, Waseda University (2000 - 2000)
- Panelist, Fourth International Conference and Exhibition on Horizontal Well Technology, Calgary, Alberta, Canada, International Conference and Exhibition on Horizontal Well Technology (2000 - 2000)
- Short course on Reservoir Simulation, Petroleum Engineering Department, Stanford University (2000 - 2000)
- Member of Technical Committee, 2000 SPE Asia Pacific Conference (Japan), Society of Petroleum Engineers (1999 - 2000)
- Co-organizer and presenter, Workshop on Challenges of Multiphase Flow in Horizontal Wells, Porsgrunn, Norway, Workshop on Challenges of Multiphase Flow in Horizontal Wells (1999 - 1999)
- Invited Speaker, Chemical Engineering Fluid Mechanics Group, Stanford University (1999 - 1999)
- Invited Speaker, Workshop on Multiscale Modeling and Simulation of Flow and Transport in Porous Media, Los Alamos National Laboratory, Los Alamos, NM, Workshop on Multiscale Modeling and Simulation... (1999 - 1999)
- Invited speaker, SPE Forum on Reservoir Engineering Aspects of Multilateral and Advanced Wells, Breckenridge, CO, Society of Petroleum Engineers (1999 - 1999)
- Mini-symposium co-organizer and session chair, Fifth SIAM Geosciences Conference San Antonio, TX, Society of Industrial and Applied Mathematics (1999 - 1999)
- Session chair and presenter, Heriot-Watt - Stanford Forum, Edinburgh, UK, Heriot-Watt - Stanford Forum (1999 - 1999)
- Short course on Reservoir Simulation, Chevron, San Ramon, CA, Chevron (1999 - 1999)
- Short course on Reservoir Simulation, Petroleum Engineering Department, Stanford University (1999 - 1999)
- Co-Director, Stanford Advanced Wells Affiliates Program (SUPRI-HW), Stanford University (1998 - 2010)

- Member, Graduate Admissions Committee, Petroleum Engineering, Stanford University (1998 - 2001)
- Member of Technical Committee, 1999 SPE Reservoir Simulation Symposium, Society of Petroleum Engineers (1998 - 1999)
- Invited speaker, Petroleum Engineering, University of Texas at Austin, University of Texas, Austin (1998 - 1998)
- Member, SPE Forum Steering Committee, Society of Petroleum Engineers (1998 - 1998)
- Short course on Reservoir Simulation, Petroleum Engineering Dept, Stanford University (1998 - 1998)
- Short course on Upscaling, Japan National Oil Corporation, Tokyo, Japan, Japan National Oil Corporation (1998 - 1998)
- Invited plenary speaker and session chair, Fourth SIAM Geosciences Conference, Albuquerque, New Mexico, Society for Industrial and Applied Mathematics (1997 - 1997)
- Invited speaker, Petroleum Engineering, Stanford University (1997 - 1997)
- Member, Society for Industrial and Applied Mathematics (SIAM) (1996 - present)
- Member, SPE Journal Editorial Board, SPE Journal (1996 - 2006)
- Invited speaker, Applied Math Colloquium, California Institute of Technology, Pasadena, California Institute of Technology (1996 - 1996)
- Invited speaker, Chemical Engineering, University of Southern California, Los Angeles, University of Southern California (1996 - 1996)
- Invited speaker, Elf Aquitaine Production, Pau, France, Elf Aquitaine (1996 - 1996)
- Invited speaker, SPE Forum Series in Europe on Upscaling, Aviemore, UK, Society of Petroleum Engineers (1996 - 1996)
- Member, Society of Petroleum Engineers (SPE) (1994 - present)

PROFESSIONAL EDUCATION

- Ph.D., Massachusetts Institute of Technology , Chemical Engineering (1986)
- M.S., Massachusetts Institute of Technology , Chemical Engineering Practice (1982)
- B.S., Pennsylvania State University , Chemical Engineering (1981)

LINKS

- Smart Fields Consortium: http://smartfields.stanford.edu/
- Stanford Center for Carbon Storage: https://sccs.stanford.edu/
- Google Scholar: Durlofsky: https://scholar.google.com/citations?hl=en&user=lb7BrecAAAAJ&view_op=list_works&sortby=pubdate

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Research

Dr. Durlofsky co-directs the Stanford Smart Fields Consortium and the Reservoir Simulation Research industrial affiliates programs. His research involves a range of topics related to modeling, history matching, and optimizing subsurface flow processes, particularly oil and gas production and geological carbon storage operations. These optimization problems may entail, for example, the determination of the optimal number, type and placement of wells, along with their operational settings. Dr. Durlofsky's research group treats optimization and history-matching both separately and in combination (in the latter case it is a "closed-loop" problem). These applications typically require large numbers of flow simulations, and this can result in extreme computational demands. The group's current work is addressing this issue through the development of very fast deep-learning-based and reduced-order "surrogate" models, which can be used to replace many of the full-order numerical simulations. Recent work along these lines includes the development of POD-TPWL reduced-order numerical models, and the E2C deep-learning-based surrogate model. Related work entails the development of geological-parameterization techniques suitable for use in history matching (most recently CNN-PCA. Additional areas of interest include data-space inversion for predicting flow behavior based only on prior-model simulations and observed data (posterior/history-matched models are not constructed), multifidelity methods for uncertainty quantification, and modeling and upscaling of flow in fractured reservoirs. Dr. Durlofsky is also active

in the area of energy systems optimization, where the goal may be, for example, to determine the optimal design and operation of integrated fossil-renewable electricity generation facilities.

Teaching

I teach or co-teach graduate courses on advanced reservoir engineering, reservoir simulation, and advanced reservoir simulation. These classes focus on the analytical description and computational modeling of subsurface flow phenomena. I also co-teach an undergraduate class on energy and the environment.

Professional Activities

I co-direct the Stanford University Industrial Affiliates Programs on Smart Fields and Reservoir Simulation Research (SUPRI-B). Outside of Stanford, I serve on the Editorial Boards of two journals, Computational Geosciences and Mathematical Geosciences, and I am a permanent member of the European Conference on the Mathematics of Oil Recovery (ECMOR) Program Committee. I am also an active member of the Society of Petroleum Engineers and the Society for Industrial and Applied Mathematics.

Teaching

COURSES

2025-26

- Advanced Subsurface Flow Simulation: ENERGY 224 (Aut)
- ESE Graduate Seminar: ENERGY 352 (Win)
- Energy and the Environment: EARTHSYS 101, ENERGY 101 (Win)
- Subsurface Flow Simulation: ENERGY 223 (Spr)

2024-25

- Energy and the Environment: EARTHSYS 101, ENERGY 101 (Win)
- Subsurface Flow Simulation: ENERGY 223 (Spr)

2023-24

- Advanced Subsurface Flow Simulation: ENERGY 224 (Aut)
- ESE Master's Graduate Seminar: ENERGY 351 (Aut)
- ESE PhD Graduate Seminar: ENERGY 352 (Aut)
- Energy and the Environment: EARTHSYS 101, ENERGY 101 (Win)
- Subsurface Flow Simulation: ENERGY 223 (Spr)

2022-23

- Advanced Reservoir Engineering: ENERGY 222 (Spr)
- Energy and the Environment: EARTHSYS 101, ENERGY 101 (Win)
- Subsurface Flow Simulation: ENERGY 223 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Catherine Callas, RALPH PIAZZA, Changgyun Son

Doctoral Dissertation Advisor (AC)

Dylan Crain, Guido Di Federico, Filippos Kostakis, Wenchao Teng

Doctoral (Program)

Mofopefoluwa Ajani, Xiaowen He, Keisuke Yamamura

Publications

PUBLICATIONS

- **Recurrent transformer U-Net surrogate for flow modeling and data assimilation in subsurface formations with faults** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Han, Y., Durlofsky, L. J.
  2026; 556
- **Prediction of fault slip tendency in CO₂ storage using data-space inversion** *COMPUTERS & GEOSCIENCES*
  He, X., Jiang, S., Durlofsky, L. J.
  2026; 210
- **Latent diffusion models for parameterization of facies-based geomodels and their use in data assimilation** *COMPUTERS & GEOSCIENCES*
  Di Federico, G., Durlofsky, L. J.
  2025; 194
- **Three-Dimensional Latent Diffusion Models for Parameterizing and History Matching Facies Systems Under Hierarchical Uncertainty** *MATHEMATICAL GEOSCIENCES*
  Di Federico, G., Durlofsky, L. J.
  2025
- **Likelihood-free inference and hierarchical data assimilation for geological carbon storage** *ADVANCES IN WATER RESOURCES*
  Teng, W., Durlofsky, L. J.
  2025; 201
- **Graph network surrogate model for optimizing the placement of horizontal injection wells for CO2 storage** *INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL*
  Tang, H., Durlofsky, L. J.
  2025; 145
- **Deep learning framework for history matching CO₂ storage with 4D seismic and monitoring well data** *GEOENERGY SCIENCE AND ENGINEERING*
  Wang, N., Durlofsky, L. J.
  2025; 248
- **Accelerated training of deep learning surrogate models for surface displacement and flow, with application to MCMC-based history matching of CO2 storage operations** *GEOENERGY SCIENCE AND ENGINEERING*
  Han, Y., Hamon, F. P., Durlofsky, L. J.
  2025; 246
- **Graph network surrogate model for subsurface flow optimization** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Tang, H., Durlofsky, L. J.
  2024; 512
- **Surrogate model for geological CO 2 storage and its use in hierarchical MCMC history matching** *ADVANCES IN WATER RESOURCES*
  Han, Y., Hamon, F. P., Jiang, S., Durlofsky, L. J.
  2024; 187
- **History matching for geological carbon storage using data-space inversion with spatio-temporal data parameterization** *INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL*
  Jiang, S., Durlofsky, L. J.
  2024; 134
- **Multi-asset closed-loop reservoir management using deep reinforcement learning** *COMPUTATIONAL GEOSCIENCES*

Nasir, Y., Durlofsky, L. J.
2023

- **Neural network surrogate for flow prediction and robust optimization in fractured reservoir systems** *FUEL*
  Do Kim, Y., Durlofsky, L. J.
  2023; 351
- **Integrated Framework for Constrained Optimization of Horizontal/Deviated Well Placement and Control for Geological CO2 Storage** *SPE JOURNAL*
  Zou, A., Durlofsky, L. J.
  2023; 28 (5): 2462-2481
- **An integrated framework for optimalmonitoring and historymatching in CO2 storage projects** *COMPUTATIONAL GEOSCIENCES*
  Crain, D. M., Benson, S. M., Saltzer, S. D., Durlofsky, L. J.
  2023
- **Practical Closed- Loop Reservoir Management Using Deep Reinforcement Learning** *SPE JOURNAL*
  Nasir, Y., Durlofsky, L. J.
  2023; 28 (3): 1135-1148
- **Use of multifidelity training data and transfer learning for efficient construction of subsurface flow surrogate models** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Jiang, S., Durlofsky, L. J.
  2023; 474
- **Deep reinforcement learning for optimal well control in subsurface systems with uncertain geology** *JOURNAL OF COMPUTATIONAL PHYSICS*
  Nasir, Y., Durlofsky, L. J.
  2023; 477
- **Convolutional - recurrent neural network proxy for robust optimization and closed-loop reservoir management** *COMPUTATIONAL GEOSCIENCES*
  Kim, Y., Durlofsky, L. J.
  2023
- **Optimization of Subsurface Flow Operations Using a Dynamic Proxy Strategy** *MATHEMATICAL GEOSCIENCES*
  Ma, Z., Kim, Y., Volkov, O., Durlofsky, L. J.
  2022
- **A New Flow-Kinematics-Based Model for Time-Dependent Effective Dispersion in Mixing-Limited Reactions** *WATER RESOURCES RESEARCH*
  Deucher, R. H., Durlofsky, L. J.
  2022; 58 (9)
- **Effective treatment of geometric constraints in derivative-free well placement optimization** *JOURNAL OF PETROLEUM SCIENCE AND ENGINEERING*
  Zou, A., Ye, T., Volkov, O., Durlofsky, L. J.
  2022; 215
- **Deep-learning-based coupled flow-geomechanics surrogate model for CO(2)sequestration** *INTERNATIONAL JOURNAL OF GREENHOUSE GAS CONTROL*
  Tang, M., Ju, X., Durlofsky, L. J.
  2022; 118
- **Multigroup strategy for well control optimization** *JOURNAL OF PETROLEUM SCIENCE AND ENGINEERING*
  Ma, Z., Volkov, O., Durlofsky, L. J.
  2022; 214
- **Use of low-fidelity models with machine-learning error correction for well placement optimization** *COMPUTATIONAL GEOSCIENCES*
  Tang, H., Durlofsky, L. J.
  2022

- **Treatment of model error in subsurface flow history matching using a data-space method** *JOURNAL OF HYDROLOGY*
  Jiang, S., Durlofsky, L. J.
  2021; 603
- **Computational optimization of solar thermal generation with energy storage** *SUSTAINABLE ENERGY TECHNOLOGIES AND ASSESSMENTS*
  Orsini, R. M., Brodrick, P. G., Brandt, A. R., Durlofsky, L. J.
  2021; 47
- **A Recurrent Neural Network-Based Proxy Model for Well-Control Optimization with Nonlinear Output Constraints** *SPE JOURNAL*
  Kim, Y., Durlofsky, L. J.
  2021; 26 (4): 1837-1857
- **Data-Space Inversion With a Recurrent Autoencoder for Naturally Fractured Systems** *FRONTIERS IN APPLIED MATHEMATICS AND STATISTICS*
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