

## EDUARDO GILDIN, PHD

Assistant Professor

CJ Craft Faculty Fellowship in Petroleum Engineering

Texas A&M University  
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### RESEARCH INTERESTS

Control of dynamical systems, the mathematics of reservoir simulation, numerical methods for control and model reduction of large-scale systems, finite element modeling, numerical analysis and optimization with an emphasis on petroleum engineering problems.

### EDUCATION

Ph.D., <i>The University of Texas at Austin</i> , Aerospace Engineering <u>Dissertation</u> : Model and Controller Reduction of Large-Scale Structures Based on Projection Methods (Advisor: Dr. Robert H. Bishop)	Aug/2006
M.Sc., <i>University of Sao Paulo, Brazil</i> , Mechanical and Mechatronics Eng. <u>Thesis</u> : Development of an Adaptive Control for Flexible Manipulators with Payload Uncertainties (Advisor: Dr. Lucas Moscato)	Jul/1998
B.Sc., <i>Industrial Engineering University (FEI), Brazil</i> , Mechanical Eng. <u>Final Project</u> : A Hybrid Gas-Electric Trash Truck	Dec/1995

### PROFESSIONAL EXPERIENCE

<i>Assistant Professor, Holder of the CJ Craft Faculty Fellowship in Petroleum Engineering,</i> Texas A&M University	Nov/2009-present
<i>Post-Doctoral Fellow</i> , Institute for Computational Engineering and Sciences, Center for Subsurface Modeling, ICES-CSM The University of Texas at Austin	2006-2009
<i>Post-Doctoral Researcher</i> , Electrical and Computer Eng. Rice University, Houston	2006-2007
<i>Assistant Instructor</i> , Aerospace Engineering University of Texas at Austin	2000-2006
<i>Teaching Assistant</i> , Aerospace Engineering University of Texas at Austin	1999-2000

## AWARDS AND RECOGNITION

Foundation CMG (FCMG) Chair in Reservoir Engineering	2013-present
Holder of the CJ Craft Faculty Fellowship in Petroleum Engineering:	2010-present
Post-doctoral Fellowship, ICES-CSM, University of Texas at Austin	2006-2009
College of Engineering's Texas Excellence Teaching Award, University of Texas at Austin	2001
Outstanding Achievement in Teaching for the year 2000-01, Aerospace Engineering Department at The University of Texas at Austin	2001
Teaching Assistant Fellowship - Aerospace Engineering Department at The University of Texas at Austin	1999-2006
Summer Tuition Fellowship; Given by The Office of Graduate Studies at The University of Texas at Austin	1999
PhD Scholarship - Brazilian Research Council	1999-2003
Prize for the best Graduate Project (FEI/Cinertec-Brazil)	Dec. 1995

## SCHOLASTIC ACTIVITIES

### Courses Taught/Co-taught

Graduate: PETE689-03, Advanced Numerical Methods for Reservoir Simulation

- Spring 13, 31 enrolled.
- Spring 12, 37 enrolled.
- Spring 11, 25 enrolled.
- Spring 10, 22 enrolled. New class offered in the graduate curriculum.

Graduate: PETE689, High Performance Computing Applied to Earth Sciences and Petroleum Engineering

- Fall 13, 21 enrolled.
- Fall 12, 10 enrolled.
- Fall 11, 11 enrolled. New class offered in the graduate curriculum.
- Multidisciplinary. Co-taught with CSCE department (Dr. Vivek Sarin) and Dr. George Moridis

Undergraduate: PETE301, Petroleum Numerical Methods – Study Abroad Program (Brazil)

- Summer 13, 9 enrolled.

Undergraduate: PETE401, Applications of Reservoir Simulation

- Fall 13, 45 enrolled.
- Fall 12, 35 enrolled.
- Fall 11, 45 enrolled
- Fall 10, 37 enrolled

### Mentoring and Supervision

#### *Undergraduate Students*

1. Robert Joseph Strong – PETE Student. Summer Internship (Summer 13). Worked on integration of reservoir simulators (Eclipse, Petrel, MRST) for model reduction purposes.
2. Rafael de Holanda – Chemical Engineering Student - “Application of PID Control to Reservoir Optimization”. January- September, 2012. Funded through Science Without Borders Program, Brazilian Funding Agency (CNPq and ANP).

### *Masters Students*

1. Thomas Jai Lopez, MSc – “Model Predictive Control in Closed Loop Reservoir Management”. **Graduated Dec. 2011**
2. Thorn Lerlertpakdee, MSc – “Model Reduction and Optimization Using Network Models”. Co-Advising with Behnam Jafarpour (PETE Department). **Graduated Summer 2012.**
3. Obiajulu Nwosa, MSc – “Integrating Petrel and Matlab Seamlessly for Reservoir Simulation”. (PETE Department), **Graduated Spring 2013.**
4. Mark Fondren, MSc – “Applying Calibration to Improve Uncertainty Assessment” – Co-Chair (Chair Dr. Duane McVay). (PETE Department) **Graduated Spring 2013.**
5. Sergio Gonzalez, MSc – “Temperature Inversion in Reservoir Engineering”. (PETE Department). **Graduated Summer 2013.**
6. Sevaphol Iemcholvilert, MSc, “A Research on Production Optimization of Coupled Surface and Subsurface Model”, (PETE Department). **Graduated Summer 2013.**
7. Xi Wu, MSc – Couplings between Hydraulic Fracture, Reservoir Simulation and Acid Fracture Simulators. Co-Advising with Dr. Zhu and Dr. Hill. (PETE Department) Expected graduation: Fall 2013.
8. Jose Moreno, MSc, “Optimization in Hydraulic Fracturing”, (PETE Department). Expected graduation: Spring 2014.
9. Mengdi Gao, MSc – “Surface/Subsurface Couplings” - (PETE Department) Expected graduation: Summer 2014.
10. Chanapol Bhuripanyo, MSc – “Quantifying the benefit of model selection for Optimization under uncertainty”. Co- Chair with Dr. Duane McVay (Chair). (PETE Department) Expected graduation: Summer 2014.
11. Rafael Holanda, MSc - “PID Control in Reservoir Optimization”. (PETE Department) Expected graduation: Spring 2015.
12. Jarred Tooley, MSc - “Lattice Boltzman Modeling for Reservoir Simulation” – Co-advising with Dr. Hadi Nasrabadi (Chair: Gildin). ). (PETE Department) Expected graduation: Spring 2015.
13. Pei Connie, MENG. (DL Student in PETE Department). Expected graduation: Spring 2015.

### *Doctorate*

1. Xiaodan Ma, PhD – Parameter and State Reduction in Closed Loop Reservoir Management,. Expected graduation – Fall 2013. **Passed Qualifying Exam**
2. Sandeep Kaul, PhD (DL) – “Finite Element Methods for Fracture Reservoirs”. Expected graduation Fall 2013. **Passed Qualifying Exam**
3. Mohammadali Tarrahi – “Geomechanical Reservoir Model Calibration and Uncertainty Assessment From Microseismic Data”, Expected graduation – Fall 2013. Co-Chair with Dr. Jafarpour. **Passed Qualifying Exam**
4. Anastasiya Romanovskaya, PhD – Multiscale Model Order Reduction in Porous Media Flow Simulation. Co-Advising with Dr. Yalchin Efendiev (Math Department). Expected graduation: Spring 2014.
5. Reza Ghasemi – Nonlinear Model Reduction applied to Reservoir Simulation and Optimization. Expected graduation: Summer 2014. **Passed Qualifying Exam**
6. Oluwafemi Balogun, PhD (DL) – Artificial Intelligence applied to History Matching, Expected graduation: Fall 2014. **Passed Qualifying Exam**
7. Gorgonio Fuentes, PhD – Fractals in Reservoir Simulation. Expected graduation: Spring 2014. Co-Chaired with Dr. Peter Valko. **Passed Qualifying Exam**
8. Tatyana Plaksina, PhD – Well Trajectory and HF stages Optimization in Shale Gas. Expected graduation: Fall 2014. **Passed Qualifying Exam**
9. Sardar Afra. “Heterogeneous Reservoir Characterization Using HOSVD”. Co-Chair with Dr. Shankar Battacharya (ECE Department). Expected graduation: Fall 2014.

10. Manal Alotibi, PhD – Multiscale Model Order Reduction in Porous Media Flow Simulation. Co-Advising with Dr. Yalchin Efendiev (Math Department).

*Post-Doctoral/Researcher Fellow*

1. Dr. Ashraf Ibrahim – Model Reduction in Reservoir Simulation using Bilinear Transformations. Spring-Fall 13. (1 year)
2. Dr. Alexander Lozovskiy, - Multiscale Model Reduction – Start November 2013. (2 years). Co-advising with Dr. Yalchin Efendiev (Math).

*Committee Member*

PHD	MS/MENG
Mohammad Soroush – PHD – University of Calgary (external committee member). Chair: Dr. Jerry Jansen.	Ashraf A. Ibrahim - MS in CPSC
Jie . He - PHD in PETE	Connie . Pei - MEN in PETE
Kyung J. Lee - PHD in PETE	Jose . Moreno Freire - MS in PETE
Chen . Li - PHD in PETE	Chanapol . Bhuripanyo - MS in PETE
Jixiang . Huang - PHD in PETE	Abdulhamed . Alfaleh - MS in PETE
Peihong . Guo - PHD in CPSC	Fadhel . Hasan - MEN in PETE
Yanfang . Yang - PHD in MATH	Philipp . Kudryavtsev - MS in PETE *
Jichao . Han - PHD in PETE	Yannan . Zhang - MS in PETE *
Manal . Alotibi - PHD in MATH	Jihui . Ding - MS in PETE *
Jingyuan . Cui - PHD in PETE	Fernando L. Aponte Rivera - MS in CVEN
Gorgonio . Fuentes Cruz - PHD in PETE	Sevaphol . Iemcholvilert - MS in PETE *
Termpan . Pitakbunkate - PHD in PETE	Ryan . Broussard - MS in PETE *
Oluwafemi . Balogun - PHD in PETE	Xi . Wu - MS in PETE
Dongjae . Kam - PHD in PETE	Chunyang . Lu - MS in PETE
Cassandra Vonne . Beatty - PHD in PETE *	Sergio . Gonzales - MS in PETE *
Tatyana . Plaksina - PHD in PETE	Mark . Fondren - MS in PETE *
Hossein . Shamshiri - PHD in PETE	Landon . Riser - MS in PETE *
Junjing . Zhang - PHD in PETE *	Hisham . Almohammadi - MS in PETE *
Craig M. Freeman - PHD in PETE *	Clotilde R. Chen Valdes - MS in PETE *
Liangchen . Ouyang - PHD in PETE *	Sanghyun . Lee - MEN in PETE *
Sangyup . Lee - PHD in PETE *	Nancy . Hernandez Ramirez - MS in PETE *
Jihoon . Wang - PHD in PETE *	Pongsathorn . Lerlertpakdee - MS in PETE *
Kwang Hee . Chun - PHD in PETE *	Obiajulu . Nwosa - MS in PETE *
Jeong . Kim - PHD in PETE *	Hossein . Shamshiri - MS in PETE *
Shusei . Tanaka - PHD in PETE	Joachim Nwabunwanne N. Ogbechie - MS in PETE *
Alexander Jose J. Verde Salas - PHD in PETE	Thomas Jai . Lopez - MS in PETE *
Xiaonan . Wang - PHD in PETE *	Abdul . Rehman Thebo - MEN in PETE *
Mubarak Nasser M. Aldossary - PHD in PETE *	
Mohammadali . Tarrahi - PHD in PETE	
Mohammadreza, Safariforoshani-PHD in PETE *	

<p>Daegil . Yang - PHD in PETE *</p> <p>Shingo . Watanabe - PHD in PETE *</p> <p>Anastasiya Nikolaevna . Romanovskaya - PHD in MATH</p> <p>Morteza . Khodabakhshi - PHD in PETE *</p> <p>Zheng . Shen - PHD in PETE *</p> <p>Yuhe . Wang - PHD in PETE</p> <p>Xiaodan . Ma - PHD in PETE</p> <p>Yijie . Zhou - PHD in PETE</p>	<p><b>* indicates students who have graduated</b></p>
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### **Funding and Sponsored Research Projects Awarded**

#### Texas A&M

1. “Efficient Multiscale Simulation in Shale Reservoirs”, Funded by the Crisman Institute; PI: Dr. Eduardo Gildin, Co-PI: Dr. Hadi Nasrabadi, Sept. 2013 – May 2016. Total: \$368,655. (Pro-rated amount: \$184,328).
2. Foundation CMG Chair in “Robust Reduced Complexity Modeling (R2CM) in Reservoir Engineering”. Funded by FCMG; PI: Dr. Eduardo Gildin, Co-PI: Dr. Mike King. Aug 2013-Aug-2018. Total: \$1,350,000.00.
3. “Simulation of UCR using Meshless Method: Accurate Performance Predictions of Dual Porosity Reservoirs with Transverse Fractures”. Funded by Chevron ETC. PI: Dr. Eduardo Gildin; May-2013-May2015. Total: \$50,000. (in negotiation)
4. “Diagnosis of Multiple Fracture Stimulation in Horizontal Wells by Downhole Temperature Measurements for Unconventional Oil and Gas Wells”; Funded by RPSEA (DOE) Project; PI: Dr. Ding Zhu; Co-PI’s: Drs. Dan Hill and Eduardo Gildin; Nov-2011-Sept. 2014. Total \$: 987,656. (Pro-rated amount: \$250,000)
5. “Development of Novel Nonlinear Model Reduction Techniques for Production Optimization and Parameter Estimation in Heterogeneous Porous Media Flow”; Funded by ExxonMobil. PI: Dr. Eduardo Gildin; Dec. 2011 – May 2013. Total: \$229,500. (Pro-rated amount: \$229,500)
6. “Integrated Fracture Placement and design Optimization in Unconventional Gas Reservoirs”; Funded by the Crisman Institute; PI: Dr. Eduardo Gildin, Co-PI: Dr. Behnam Jafarpour; Sep. 2011 – May 2014. Total: \$343,668. (Pro-rated amount: \$343,668).
7. “Efficient Multiscale Methods in Highly Heterogeneous Porous Media”. Funded by DoD – Army Research Office. PI: Dr. Eduardo Gildin, Co-PI: Dr. Yalchin Efendiev (Math), Sep-2012 – July 2015. Total: \$300,000. (Pro-rated amount: 50%).
8. SPE Dallas – Graduate Student Support. “Coupling Different Simulators in a Seamless Fashion for Unconventional Gas Production Developments”. PI: Dr. Eduardo Gildin. Total \$5,000.00 (Pro-rated amount: \$5,000.00)

#### UT Austin

1. ICES Post-doctoral Fellowship, 2006-2009
2. “Automated Parameter Estimation and Sensitivity Schemes”; Department of Defense PET Projects; PI: Eduardo Gildin; Collaboration with UTEP; Funds in the order of \$100,000; 2008-2009.
3. “A Holistic Approach to Aerospace Control System Design”; Clint Murchison Chair of Free Enterprise at The University of Texas at Austin; PI: Dr. Robert H. Bishop; Funds in the order of

\$15,000; 2003.

4. Teaching Assistant Fellowship - Fall 1999 – Spring 2006 (Aerospace Engineering Department at The University of Texas at Austin)
5. Summer Tuition Fellowship; Given by The Office of Graduate Studies at The University of Texas at Austin, Summer 1999
6. PhD Scholarship - Fall 1999 – Spring 2003 (CNPq - Brazilian Research Council)

#### Brazil

1. Master of Science Scholarship - (CAPES) University of Sao Paulo (1996-1998)

### **PROFESSIONAL ACTIVITIES & AFFILIATIONS**

#### **University Service**

##### *College of Engineering (COE)*

PETE Representative on “Establishing the Interdisciplinary Master’s Degree in Systems Engineering (Summer 2013-present)

Engineering Faculty Advisory Council (EFAC) - Petroleum Engineering Department Representative (term: 2010-2012);

College of Engineering and Petroleum Engineering Department: Department Head Search Committee;

##### *Petroleum Engineering Department (PETE)*

PETE Faculty Leader – Study Abroad Program in Brazil - summer 2013 (PUC-Rio de Janeiro) and Summer 2014 (UFPE-Recife);

Faculty Search Committee (2012-2013);

Graduate Admissions Committee (2013 –present);

PETE Growth Committee (2013);

Primary Representative for Texas A&M’s membership with the Foundation CMG (2012-present);

Award Committee for the Graduate Fellowships in Applied Mathematics and Computer Applications in Petroleum Engineering (PETE-AMCAPE) (2012-present)

PETE Graduate Seminar Series Organizer (2011 – present)

#### **Conference & Meeting Organization**

Technical Committee - LACPEC – 2013 SPE Latin American and Caribbean Petroleum Engineering Conference. Date: May 21-23, 2014. Place: Maracaibo, Venezuela.

Mini-Symposium Organization: SIAM Conference on Computational Science and Engineering (CSE13), “Model Reduction and Surrogate Modeling Advances in Porous Media Flow Simulation and Optimization” February 25 through March 1, 2013, Boston, MA.

Technical Committee - SPE Forum - New and Novel Techniques for Reservoir Modeling (Thinking Outside of the Conventional/Traditional Modeling Box). Chairs: Dr. Shah Kabir, Hess Corporation; Dr. Stan Cullick, Berry Petroleum; Organizing Session 7 with Dr. Benoit Couet – Future of Surrogate Modeling. Santa Fe, NM, November 4-9, 2012.

Technical Committee – SPE ATW Workshop. History Matching: Field Experiences and Lessons Learned; Chairs: Javier Rodriquez, Pacific Rubiales and Dr. Akhil Datta-Gupta, Texas A&M. Cartagena, Colombia, August 3-4, 2011.

Mini-Symposium Organization: SIAM Conference on Mathematical & Computational Issues in the Geosciences, held on 19-22 March 2007, Santa Fe, NM.



## Associate Editor

SPE Journal

## Technical Reviewer

Oak Ridge Associated Universities (ORAU) Ad Hoc Reviewer, NSF Ad Hoc Reviewer, SPE Journal (SPEJ), SPE Journal of Reservoir Evaluation and & Engineering (SPEREE), SPE Journal of Production & Operations (SPEPO), SPE Journal of Drilling and Completions (SPEDC), Journal of Petroleum Sciences and Engineering, Journal of Computational and Applied Mathematics, Computational Geosciences, Parallel Computing, Automatica, IEEE Conference on Decisions and Control; IEEE American Control Conference; Progress in Computational Fluid Dynamics: An International Journal; Geothermics.

## Affiliations

Society of Petroleum Engineers (SPE); Institute of Electrical and Electronics Engineers (IEEE); Society for Industrial and Applied Mathematics (SIAM); International Society for Porous Media (INTERPORE); European Association of Geoscientists and Engineers (EAGE);

## PUBLICATIONS

### Peer-Reviewed Journal Papers (\* means Dr. Gildin's students)

1. G. Fuentes\*, E. **Gildin**, P. Valko, "Analyzing Production Data From Hydraulically Fractured Wells: the Concept of Induced Permeability Field" SPERE-0213-0011. Accepted for Publication.
2. E. **Gildin**, R. Ghasemi\*, A. Protasov and Y. Efendiev, "Nonlinear Complexity Reduction for Fast Simulation of Flow in Heterogeneous Porous Media", SPE163618. SPE Journal – in Review.
3. X. Wu\*, C. Oeth, D. Zhu, A.D. Hill, E. **Gildin**, "Integrated 3D Acid Fracturing Model for Carbonate Reservoir Stimulation". Submitted to SPE Productions & Operations (SPERE). In review.
4. Y. Efendiev, J. Galvis and E. **Gildin**, "Local-global multiscale model reduction for flows in high-contrast heterogeneous media", Journal of Computational Physics, Volume 231, Issue 24, p. 8100-8113.
5. E. **Gildin**, A.C. Antoulas, D. Sorensen, and R.H. Bishop "Model and Controller Reduction Applied to Structural Control Using Passivity Theory", Structural Control and Health Monitoring Journal, Volume 16, Issue 3, Date: April 2009, Pages: 319-334.
6. P. Lerlertpakdee\*, E. **Gildin** and B. Jafarpour, "Efficient Production Optimization Using Flow Network Models", Submitted to SPEJ., March 2013. Accepted with minor revisions.
7. E. **Gildin**, "Model Order Reduction in Reservoir Applications: A Review," *in preparation to be submitted* to the Journal of Petroleum Science and Engineering, September, 2013.
8. M. Ghommam, V.M. Calo, Y. Efendiev, and E. **Gildin**, "Complexity Reduction of Multi-Phase Flows in Heterogeneous Porous Media", to be submitted to SPEJ, October 2013.
9. M. Presho, A. Protasov, and E. **Gildin**, "Local-Global Model Reduction of Parameter-Dependent, Single-Phase Flow Models via Balanced Truncation" submitted to Journal of Computational and Applied Mathematics, September 2013.
10. T. Plaksina\*, X. Ma\*, and E. **Gildin**, "Optimization Framework for Integrated Placement of Horizontal Wells and Hydraulic Fracture Stages in Unconventional Gas Reservoirs", submitted to The Journal of Unconventional Oil and Gas Resources, October 2013.

## Peer-Reviewed Conference Proceedings (\* means Dr. Gildin's students)

### Submitted

1. S. Kaul and E. Gildin, "Understanding the Reservoir Drive Mechanisms in Liquid-Rich Unconventional Reservoirs and its Effect on Long Term Deliverability", Abstract submitted to 2014 SPE Unconventional Resources Conference, The Woodlands, Texas, USA. 1-3 April 2014. (in review).
2. M. Tarrahi, E. Gildin and S. Gonzalez, "Dynamic Integration of DTS Data for Hydraulically Fractured Reservoir Characterization with the Ensemble Kalman Filter". Abstract submitted to 2014 SPE Unconventional Resources Conference, The Woodlands, Texas, USA. 1-3 April 2014. (in review).
3. A. Ibrahim and E. Gildin, "Reduced Order Modeling In Reservoir Simulation Using the Bilinear Approximation Techniques". Abstract submitted to SPE LACPEC, to be held in Maracaibo, Venezuela. May 21-23, 2014. (in review).
4. S. Afra\*, E. Gildin and M. Tarrahi\*, "Heterogeneous Reservoir Characterization using Efficient Parameterization through Higher Order SVD (HOSVD)". Full Paper Submitted to the 2014 IEEE American Control Conference (ACC) to be held in Portland, Oregon. June 4-6, 2014. (in review).

### Accepted/Published

5. G. Fuentes\*, E. **Gildin**, P. Valko , SPE-168608-MS, "On the Analysis of Production Data: Practical Approaches for Hydraulically Fractured Wells in Unconventional Reservoirs, accepted to be presented at SPE Hydraulic Fracturing Technology Conference to be held 4 – 6, February, 2014 in The Woodlands, TX, USA.
6. S. Afra\* and E. **Gildin**, "Permeability Parameterization Using Higher Order Singular Value Decomposition (HOSVD)", Accepted to be presented at the IEEE 12th International Conference on Machine Learning and Applications (ICMLA'13) to be held in Miami, Florida, USA, December 4 – December 7, 2013.
7. X. Wu\*, C. Oeth, D. Zhu, A.D. Hill, E. **Gildin**, "Integrated 3D Acid Fracturing Model for Carbonate Reservoir Stimulation". In Proceedings of the 2013 Offshore Technology Conference (OTC Brazil), to be held in Rio de Janeiro, Brazil. October 29-31, 2013.
8. X. Ma\*, T. Plaxina\* and E. **Gildin**, "Integrated Horizontal Well Placement and Hydraulic Fracture Stages Design Optimization in Unconventional Gas Reservoirs, Accepted to be presented at the 2013 SPE Unconventional Resources Conference, Calgary, Canada, 5-7 November 2013.
9. M. Ghommem, V.M. Calo, Y. Efendiev, and E. **Gildin**, "Complexity Reduction of Multi-Phase Flows in Heterogeneous Porous Media" Accepted to be presented at at the 2013 SPE Kuwait Oil and Gas Show and Conference (KOGS) to be held 07-10 October 2013 at Kuwait International Fair, Mishref, Kuwait.
10. X. Ma\*, T. Plaxina\* and E. **Gildin**, "Numerical Optimization of Hydraulic Fracture Stages on Horizontal Wells in Shale Gas Reservoirs". In Proceedings of the 2013 Unconventional Resources Technology Conference (URTeC). Denver, Colorado, 12-14 August 2013.
11. E. **Gildin**, R. Ghasemi\*, A. Protasov and Y. Efendiev, "Nonlinear Complexity Reduction for Fast Simulation of Flow in Heterogeneous Porous Media", SPE163618 – Proceedings of the SPE Reservoir Simulation Symposium, February 2013, The Woodlands, TX.
12. G. Fuentes\*, E. **Gildin**, P. Valko, "Analyzing Production Data From Hydraulically Fractured Wells: the Concept of Induced Permeability Field". In Proceedings SPE Hydraulic Fracture Conference. February, 2013. The Woodlands, TX.
13. E. **Gildin** and T. Lopez\*, "Closed-Loop Reservoir Management: Do we need complex models?", in Proceeding of the SPE Digital Energy Conference and Exhibition, The



Woodlands, TX, USA, 19-21 April, 2011

14. E. **Gildin**, “Closed Loop Reservoir Management: an Overview”. Keynote Speaker - In Proceedings of DINAME 2011 – 14th. International Symposium on Dynamics Problems on Mechanics, Sao Sebastiao, SP, Brazil, March 2011
15. E. **Gildin**, “Parameterized Model Reduction Applied to Reservoir Simulation”, In Proceeding of the ECMOR XII, Oxford, England, 2010.
16. E. **Gildin** and M.F. Wheeler, “Optimal Subsurface Flow Management using Model Predictive Control Techniques”, in Proceedings of the European Conference on the Mathematics of Oil Recovery – ECMOR XI – Bergen, Norway, September 2008
17. E. **Gildin** and M.F. Wheeler, “Control of Subsurface Flow Using Model Predictive Control Techniques”, in Proceedings of the International Conference on Engineering Optimization, Brazil, June, 2008.
18. E. **Gildin**, A.C. Antoulas, D. Sorensen, and R.H. Bishop “An Educational Perspective to Model and Controller Reduction of Dynamical Systems, 46th. IEEE Conference on Decision and Control (CDC), New Orleans, December, 2007.
19. E. **Gildin**, A.C. Antoulas, R.H. Bishop and D. Sorensen, “Model and Controller Reduction for the Second Generation Benchmark Control Problem for Seismic Excited Buildings”, In Proceedings of the Fourth World Conference on Structural Control and Monitoring, July 2006, San Diego.
20. E. **Gildin**, H. Klie, A. Rodriguez, M.F. Wheeler and R. H. Bishop, “ Projection-based Approximation for Large-Scale Reservoir Simulation”, Proceedings of the 10th European Conference on the Mathematics of Oil Recovery (ECMOR)— Amsterdam, The Netherlands, September 2006.
21. E. **Gildin**, H. Klie, A. Rodriguez, M.F. Wheeler and R. H. Bishop, “Development of Low-Order Controllers for High-Order Reservoir Models and Smart Wells”, Proceedings of the SPE Annual Technical Conference, San Antonio, TX, September, 2006.
22. R. H. **Bishop**, E. Gildin, L. Nick, J. S. Falcon, “Unifying control design and implementation in an undergraduate control systems laboratory”, In Proceedings of the 7th IFAC Symposium on Advances in Control Education, June 2006, Madrid, Spain.
23. E. **Gildin**, R. H. Bishop and Nicholas Lin, “A Holistic Approach for a Control System Design Laboratory”, In Proceedings of the 18th. International Congress of Mechanical Engineering, COBEM 2005, Minas Gerais, Brazil.
24. S. **Gugercin**, A.C. Antoulas, C.A. Beattie and E. Gildin, “Krylov-based controller reduction for large-scale systems”, Proceedings of the 43rd IEE Conference on Decision and Control, December 2004.
25. C. **Beattie**, S. Gugercin, A. C. Antoulas, E. Gildin, "Controller Reduction by Krylov Projection Methods", In Proceedings of the Sixteenth International Symposium on Mathematical Theory of Networks and Systems (MTNS2004)
26. E. **Gildin**, L. Moscato, R. Gonzalez, "Development of an Adaptive Control for Flexible Manipulators with Payload Uncertainties", Brazilian Congress of Mechanical Engineering - COBEM97, 1997.
27. E. Gildin, A.C. **Bastos Jr.**, A. Wulfhorst, "Proposal of a Hybrid Power-Train (Gas-Electric) for a Trash Truck", XI International Congress of Society of Automotive Engineering - SAE 97 – 1997.

### Conference Presentations (not peer-reviewed)

1. E. **Gildin**, “Parameterized Model-Order Reduction for Large-Scale Reservoir Models”, Invited Speaker at the Multiscale Model Reduction Techniques for Subsurface Flow MiniSymposia at the 2011 SIAM Conference on Mathematical & Computational Issues in the

- Geosciences, March 2011, Long Beach, CA.
2. E. **Gildin**, A.C. Antoulas, D. Sorensen, and R.H. Bishop “An Overview of Model Reduction Techniques Applied to Large-Scale Structural Dynamics and Control”, In Proceedings of at the McMAT 07, Austin, TX, July, 2007.

(bold names indicate the main presenter)

### Class Notes

1. “Controls Laboratory -- Controls Experiments and Computer Projects”, Aerospace Engineering Department, Students Notes and Manual, Spring 2004. The University of Texas at Austin.
2. Flight Simulator Experiments and Computer Projects – Laboratory Manual used by the students, 2003, Aerospace Engineering Department, UT-Austin.
3. “Equations of Motion for an Inverted Pendulum”, Internal Document, Aerospace Engineering Department, Spring 2000, UT-Austin.

### Invited Presentations

1. E. Gildin, “Research Initiatives in Reservoir Modeling and Optimization at Texas A&M University: The Search for the Optimal Closed-Loop Reservoir Management Practices”, SPE SPWLA Seção Brasil, Society of Petrophysicists and Well Log Analysts (SPE SPWLA) and BG Group, Brazil, Rio de Janeiro, July 16, 2013.
2. E. Gildin, “Local-Global Model Reduction for Large-Scale Models Integrating Systems – Theoretical Properties”, 5th Annual Spring Symposium IAMCS-KAUST Symposium, May 12-15, 2013. Saudi Arabia (KAUST).
3. E. Gildin, “Nonlinear Model Reduction in Porous Media Flow Simulation”, SIAM Conference on Computational Science and Engineering (CSE13), Boston, MA, February 2013.
4. E. Gildin, “Complexity Reduction for Fast Simulation of Flow in Nonlinear Heterogeneous Porous Media” ConocoPhillips, Houston, TX, October 24, 2012
5. E. Gildin, “Local-Global Multiscale model reduction using system theoretical properties for Flow in Heterogeneous Porous Media”, INTERPORE, Purdue University, May 14-16, 2012.
6. E. Gildin, “Local-Global Multiscale model reduction using system theoretical properties for Flow in Heterogeneous Porous Media”, 10<sup>th</sup> World Congress on Computational Mechanics (WCCM 2012) ; Sao Paulo, Brazil, July 09-13, 2012.
7. E. Gildin, “Model Order Reduction in Porous Media Flow”, Distinguished Invited Talk at The University Of Texas at El Paso – UTEP, TX. Sponsored by the Program in Computational Science/Cyber-ShARE Center and the Department of Geological Sciences. October 21, 2011.
8. E. Gildin, “Mitigating the Computational Cost in History Matching and Production Optimization of Large-Scale Reservoirs”. Presented at the SPE Workshop – Reservoir Descriptions and Dynamics: History Matching: Field Experiences and Lessons Learned. Cartagena, Colombia. August 2011.
9. E. Gildin, “Large-Scale Control of Reservoirs: Coping with the Curse of Dimensionality”. Presented at the Petroleum Engineering Department – J.L. Corky Frank Graduate Seminar Series. March 2011.
10. E. Gildin, “Closed Loop Reservoir Management in a System Framework”, Keynote Speaker for the DINAME 2011 – 14th. International Symposium on Dynamics Problems on Mechanics, Sao Sebastiao, SP, Brazil, March 2011.
11. E. Gildin, “Model Order Reduction in Porous Media Flow”, Invited Speaker at the IAMCS Workshop in Large-Scale Inverse Problems and Uncertainty Quantification; February 24-25, 2011, College Station, TX.
12. E. Gildin, “Parameterized Model-Order Reduction for Large-Scale Reservoir Models”, Invited Speaker at the Multiscale Model Reduction Techniques for Subsurface Flow MiniSymposia at

- the 2011 SIAM Conference on Mathematical & Computational Issues in the Geosciences, March 2011, Long Beach, CA.
13. E. Gildin, “A Practical Approach to Large-Scale Online Computations Applied to Optimal Geosystems Management Using Graphical Programming”, invited talk at the CSM Industrial Affiliates Meeting, October 14-15, 2009, Austin, TX.
  14. E. Gildin and M.F. Wheeler, “A New Approach to Large-Scale Online Computations Applied to Optimal Geosystems Management Using Graphical Programming”, invited talk at the NI Week, August 3-7, 2009, Austin, TX.
  15. E. Gildin, “Closed-Loop Reservoir Management in a Systems Framework”, invited talk at the University of Calgary and CMG; Chemical and Petroleum Engineering Department, February 2009, Calgary, Canada.
  16. E. Gildin, Klie H. and M.F. Wheeler, “Model Reduction of Large-Scale Reservoirs using the Generalized Low-Rank Approximation of Matrices”, invited talk at the SPE Applied Technology Workshop, June 23-26, 2008, Bruges, Belgium.
  17. E. Gildin, H. Klie, A. Rodriguez and M. F.Wheeler, “Large-Scale Control in Porous Media Flow”, presented at the SIAM Conference on Control and its Applications, San Francisco, CA, June, 2007.
  18. E. Gildin, H. Klie, A. Rodriguez and M. F.Wheeler, “Low-Order Approximation Methods for Oil Reservoir Simulation and Control ”, presented at the SIAM Conference on Mathematical & Computational Issues in the Geosciences, Santa Fe, NM, March, 2007.
  19. E. Gildin, A.C. Antoulas, D. Sorensen, “ Model Reduction Applied to Large-Scale Structural Dynamics and Control”, presented at the SIAM Conference on Computational Science and Engineering, Costa Mesa, CA, February 2007.
  20. E. Gildin, A.C. Antoulas, D. Sorensen, R.H.Bishop, “An Overview of Model Reduction techniques Applied to Large-Scale structural Dynamics and Controls” , Purdue University, Computing Research Institute (CRI), Spring 2007 Seminar Series, January, 24, 2007.
  21. E. Gildin, “Model Reduction Applied to Reservoir Simulation”, presented at the Center for Subsurface Modeling (CSM) , Industrial Affiliates Meeting, The University of Texas at Austin, October 2006
  22. R.H. Bishop and E. Gildin, “Large Scale Optimal Control and Model Reduction”, Invited Talk, 15th Annual CSM Industrial Affiliates Meeting, Center for Subsurface Modeling (CSM) , Industrial Affiliates Meeting, The University of Texas at Austin, October, 2005.
  23. E. Gildin, “Model and Controller Reduction for Large-Scale Dynamical Systems”, Invited Talk, ExxonMobil, URC, Optimization Group, November, 2005.

### **Short Courses/Consulting**

1. Mini Course: at the 14<sup>th</sup> International Symposium on Dynamical Problems of Mechanics – DINAME2011. “Course: Dynamics and Control of Large Scale Systems”. The symposium involves international and national (Brazilians) engineers, scientists, and mathematicians working in the general area of dynamical systems and control. Held in Sao Sebastiao, SP, Brazil, March 13-18, 2011.
2. E. Gildin, “A Introduction to Model Order Reduction for Large-Scale Dynamical Systems”, Short course given at Universidade Federal de Pernambuco, UFPE, Mechanical Engineering Department, March 16-18, 2009, Recife, PE. Brazil.
3. NExT – Network of Excellence in Training – Teaching Course. “Principle and Applications of Reservoir Engineering for Schlumberger Oilfield –Completions”; Schlumberger, Sugar Land, Houston. November 2011.
4. NExT – Network of Excellence in Training – Teaching Course, “Integrated Reservoir Management and Development”. – KJO in Saudi Arabia/Kuwait, 01/06/12-01/18/2012

5. NExT – Network of Excellence in Training – Teaching Course, “Reservoir Engineering”, Shell, Rio de Janeiro, Brazil; 05/22/2012 – 05/25/2012
6. NExT - Network of Excellence in Training – Teaching Course, “Fundamentals of Field Development Planning”; Houston, TX, 04/09/13-04/10/13.
7. NExT – Network of Excellence in Training – Teaching Course, “Reservoir Engineering”, Shell, Rio de Janeiro, Brazil; 08/21/2013 – 08/23/2013

### **Collaborators**

Ding Zhu (Texas A&M) Dan Hill (Texas A&M); Peter Valko (Texas A&M); Hadi Nasrabadi (Texas A&M); Robert H. Bishop (Marquette University); Mary F. Wheeler (UT-Austin); Athanasios Antoulas (Rice University); Danny Sorensen (Rice University); Shankar Battacharyya (Texas A&M); Yalchin Efendiev (Texas A&M); Dayo Oyerinde (ExxonMobil); Robert Shuttleworth (ExxonMobil); Hector Klie (ConocoPhillips); Behnam Jafarpour (USC).