



Jyoti Phirani

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Education

- Ph.D. Chemical Engineering, University of Houston, TX, USA Aug 2006 - Jun 2010
Dissertation: *Analysis of Production Strategies from Gas Hydrate Reservoirs*
Advisor: Prof. Kishore K. Mohanty
- B. Tech. Chemical Engineering, IIT Delhi, India Aug 2002 - May 2006
Thesis: *Study of Fuel Efficiency in Micro-Fluidic Fuel Cell*

Work Experience

- ❖ **Associate Professor** Department of Chemical Engineering, IIT Delhi, India May 2019 –
- ❖ **Assistant Professor** Department of Chemical Engineering, IIT Delhi, India Apr 2013 – May 2019
 - *Research interests:* Flow through porous media and its applications, enhanced oil recovery, reservoir simulation, uncertainty quantification in reservoir simulations. We use experiments and simulations to develop technology & theory for flow through porous media challenges.
 - *Projects*:* Completed two research, two consulting projects. Working on five research projects.
 - *Publications*:* 2 under review + 15 published, and several abstracts and invited talks *Details in appendix
- ❖ **Staff Reservoir Engineer** Occidental Petroleum Co., Houston, TX, USA Oct 2011 – Apr 2013
 - History matching & production forecasting for Mukhaizna steam flood field development study
 - Managed Grayburg and Holt properties (~2000 wells) in Permian basin. Responsible for booking reserves, maintaining base production, proposing projects to increase production.
 - Analyzed CO₂ enhanced oil recovery pilot with tracers. Characterized the reservoir as a layered reservoir with permeability contrast with possible cross-flow between layers.
 - Proposed horizontal wells to test different layers in the Grayburg reservoir.
- ❖ **Reservoir Engineer** Occidental Petroleum Co., Houston, TX, USA Aug 2010 – Oct 2011
 - Characterized the production from Kennedy field in West Texas. Recommended two new water injector locations. The new wells provide the opportunity for surveillance to improve the geological model for better predictions from simulator, to expand the oil reserves depending on the findings from new wells & maximize the production as per current knowledge of reservoir.
 - Simulated the phase behavior of newly acquired field oil with different injection gases, to be used for history matching the production from N₂ injection and predicting recovery for CO₂ gas flooding scenarios.
 - Worked on optimization of CO₂ flooding in North Cowden unit of Oxy Permian in different development and pilot areas.
 - Simulated Wolfberry shale reservoir with large fractures. Proposed pressure maintenance by water injection to decrease gas oil ratio and hence optimizing oil production in long term.
- ❖ **Internship** Chevron, Energy Technology Company, Houston, TX, USA May 2009 - Aug 2009
 - Studied pressure drop in horizontal wells and its effect on production of heavy oil in primary production and steam assisted gravity drainage (SAGD).

Professional Recognitions

- **Executive Editor:** Journal of Natural Gas Science and Engineering, Elsevier Oct 2017 -
- **Institute Coordinator:** Schlumberger Center of Excellence, IIT Delhi, India Apr 2017 -
- **Founder & Member:** India Chapter InterPore–International Society for Porous Media Dec 2017 -
- **Member of Advisory Committee:** InterPore membership committee Oct 2018 -
- **Advisory Committee Member:** Management & Information, Soc. of Petro. Engs. (SPE) Jan 2018 -
- **Subcommittee member:** Soc. of Petr. Eng. (SPE) Annual Tech. Conf. (ATCE) 2019 Oct 2018 -
- **Reviewer:** Fuel, J. of Natural Gas Sc. and Eng., Intl. J. of Heat & Mass Transfer, SPEJ

Appendix

Projects and Consultancy

- Investigation of flow & wettability in reservoir rocks using radiotracers. *Apr 2015-Mar 2018*
Funding: Board of Research in Nuclear Science
Role: **PI**, Budget: INR 1,958,914.
- Gas production from heterogeneous methane hydrate reservoirs *Jun 2017-May 2020*
Funding: Science and Engineering Research Board,
Role: **PI**, Budget: INR 2,047,490
- Feasibility of geothermal energy in India using single well production and injection method *Jul 2016 – Dec 2016*
Funding: ONGC Energy Centre Trust
Role: **PI**, Budget: INR 445,000
- Data driven techniques for fault and horizon identification in oil reservoirs using 3-D seismic datasets *Mar 2018-Mar 2021*
Funding: Schlumberger, Pune Technology Center
Role: **PI**, Budget: INR. 3,634,022
- Characterization of reservoir flow properties through pore scale experiments and simulations *Jul 2016 – Jun 2019*
Funding: ONGC – Institute of Reservoir Studies
Role: **Co-PI** (shared Ph.D. student and expenses), Budget: INR 7,900,000
- Uncertainty quantification in petroleum reservoir simulations *Jul 2016 – Jun 2019*
Funding: ONGC – Institute of Reservoir Studies
Role: **Co-PI** (shared Ph.D. student and expenses), INR: Rs. 4,260,000
- Separation of Asphaltene from Solid Particles *Sep 2015 – Dec 2018*
Funding: Shell Technology Centre Bangalore, India
Role: **Co-PI** (shared Ph.D. student and expenses), Budget: INR 3,300,000
- Review of field development plans of oil and gas reservoirs *Oct 2015 – Jun 2016*
Funding: Industrial Development Services
Role: **PI**, Budget: INR 410,000
- Vetting of Oil and Gas Reservoirs' Improved Oil Recovery Plans for Oil and Gas Production Profiles (6 fields) *Dec 2016 – Sep 2017*
Funding: Industrial Development Services
Role: **PI**, Budget: INR 420,000

Publications (*corresponding author)

1. H. Gupta, S. Pradhan, R. Gogia, S. Srirangarajan, J. Phirani*, S. Ranu, 2019. Deep learning-based automatic horizon identification from seismic data, (Abstract accepted for manuscript submission for Society of Petroleum Engineers' Annual Technical Conference 2019, manuscript in preparation)
2. S. Ashraf, J. Phirani*, 2019. A generalized model for spontaneous imbibition in a multi-layered porous medium, (revision submitted CES-S-19-00728)
3. A. Tomar, J. Phirani, S. Roy*, Support vector machine correlations for equations of state in reservoirs, (in revision in Journal of Petroleum Science and Engineering)
4. S. Ashraf, J. Phirani*, 2019. Capillary impregnation of viscous fluids in a multi-layered porous medium. (Manuscript accepted in AJKFluids2019, ASME, Jul 28-Aug 1, San Francisco, USA)
5. A. Ambekar, S. Ashraf, J. Phirani*, 2019. Dynamics of forced imbibition in interacting pores. (Manuscript accepted in AJKFluids2019, ASME, Jul 28-Aug 1, San Francisco, USA)
6. N. Choudhary, J. Phirani*, 2019. Methane production strategies for oceanic gas hydrate reservoirs. (Manuscript accepted in AJKFluids2019, ASME, Jul 28-Aug 1, San Francisco, USA)

7. D. Singh, S. Roy, H. J. Pant, J. Phirani*, 2019. Large-scale wettability quantification in porous media using tracers. (Manuscript accepted in AJKFluids2019, ASME, Jul 28-Aug 1, San Francisco, USA)
8. S. Khatoon, J. Phirani, S. S. Bahga*, 2019. Polynomial chaos based solution to inverse problems in petroleum reservoir engineering. (Manuscript accepted in AJKFluids2019, ASME, Jul 28-Aug 1, San Francisco, USA)
9. S. Ashraf, J. Phirani*, 2019. Capillary displacement of viscous liquids in a layered porous medium. *Soft Matter*, 15, 2057-2070
10. S. Ashraf, J. Phirani*, 2018. Spontaneous displacement of resident fluid in heterogeneous porous medium. International Conference on Nanochannels, Microchannels and Minichannels, American Society of Mechanical Engineers, 10 – 13 Jun, Dubrovnik, Croatia
11. A. Ambekar, V. V. Buwa, J. Phirani*. 2018. Interface dynamics during two-phase flow in stratified porous media. International Conference on Nanochannels, Microchannels and Minichannels, American Society of Mechanical Engineers, 10 – 13 Jun, Dubrovnik, Croatia
12. S. Ashraf, G. Visavale, J. Phirani*, 2018. Spontaneous imbibition in randomly arranged interacting capillaries. *Chemical Engineering Science*, 192, 218-234
13. J. Phirani*, S. Roy, H. J. Pant, 2018. Predicting stagnant pore volume in porous media using temporal moments of single tracer breakthrough curve. *Journal of Petroleum Science and Engineering*, 165, 640-646
14. J. Phirani*, S. Roy, H. J. Pant, 2017. Predicting dead-end pore-volume in a reservoir from single tracer experiment. *SPE* 187464
15. S. Ashraf, G. Visavale, S. S. Bahga, J. Phirani*, 2017. Spontaneous imbibition in parallel layers of packed beads. *The European Physical Journal E*, 40 (4), 39
16. A. Budaraju, J. Phirani, S. Kondaraju, S. S. Bahga*, 2016. Capillary displacement of viscous liquids in geometries with axial variations. *Langmuir*, 32(41), 10513-10521
17. P. Bhade, J. Phirani*, 2015. Effect of geological layers on hydrate dissociation in gas hydrate reservoirs. *Journal of Natural Gas Science and Engineering*, 46, 1549-1560
18. P. Bhade, J. Phirani*, 2015. Gas production from layered methane hydrate reservoirs. *Energy*, 82, 686-696
19. J. Phirani, K. K. Mohanty*, 2010. Kinetic simulation of CO₂ flooding of methane hydrate. *SPE* 13417.
20. J. Phirani, G.J. Hirasaki, K.K. Mohanty*, 2009. Warm water flooding of unconfined gas hydrate reservoirs. *Energy and Fuels*, 23 (9), 4507-4514
21. J. Phirani, R. Pitchumani, K. K. Mohanty*, 2009. Transport properties of hydrate bearing formations from pore scale modeling. *SPE* 124882
22. J. Phirani, K.K. Mohanty*, "Warm water flooding of confined gas hydrate reservoirs", *Chemical Engineering Science*, 2009, 64 (10), 2361-2369.
23. J. Phirani, R. Pitchumani, K. K. Mohanty*, 2009. History matching of hydrate formation dissociation experiments in porous media. *SPE* 118900
24. J. Phirani, S. Basu*, 2008. Analysis of fuel utilization in microfluidic fuel cell. *Journal of Power Sources*, 175(1), 261-265

Conference Abstracts and Invited Talks (*corresponding author)

1. A. Ambekar, J. Phirani, V. V. Buwa, "Pore-resolved simulations of two-phase flow through porous media" 10th International Conference on Multiphase Flow (ICMF 2019), May 19-24, 2019, Rio de Janeiro, RJ, Brazil
2. N. Choudhary, J. Phirani, "Production Strategy of Oceanic Gas Hydrate Reservoirs using Various Well Configurations", AGU Fall meeting 2018, 10-14 Dec, 2018, San Francisco, CA, USA.

3. D. Singh, S. Roy, H. J. Pant, J. Phirani*, "Finding wetting efficiency of phases in multiphase flow in porous medium using tracers", Compflu-2018 International Conference on Soft Matter and Complex Fluids, 6-9 Dec, 2018, Roorkee, India
4. A. Ambekar, S. Ashraf, J. Phirani*, "Two phase interface dynamics of forced imbibition in two interacting capillaries", Compflu-2018 International Conference on Soft Matter and Complex Fluids, 6-9 Dec, 2018, Roorkee, India
5. S. Ashraf and J. Phirani*, "Surface tension driven flows in layered porous media", Compflu-2018 International Conference on Soft Matter and Complex Fluids, 6-9 Dec, 2018, Roorkee, India
6. S. H. A. Rizvi, A. Yadav, V. Singh*, J. Phirani, "Colloidal interaction of Asphaltene and silica surfaces", Compflu-2018 International Conference on Soft Matter and Complex Fluids, 6-9 Dec, 2018, Roorkee, India
7. S. Ashraf and J. Phirani*, "Capillary driven flow in multiple interacting capillaries", 16th Multiphase Flow Conference, 13-16 Nov, 2018, Dresden, Germany
8. D. Singh, R. Painkra, S. Roy, H. Pant, J. Phirani*, "Adsorption Behavior of Oil Phase Tracers On Silica Gel for Wettability Characterization in Oil Reservoirs", International Conference on Advanced Applications of Radiation Technology, 5-7 Mar, 2018, Mumbai, India
9. J. Phirani*, "Engineering Pores in Heterogeneous Porous Media", Invited Talk, Shell Technology Center Bangalore, 28 Jul, 2017, Bangalore, India
10. M. Das, S. Roy, H. J. Pant, J. Phirani*, "Adsorption Behavior of Chloroauric Acid, a Generic Adsorbing Tracer for Finding Wetting Behavior of Fluids in Oil and Gas Industry", International Conference on Application of Radiation Science and Technology, 24-28 Apr, 2017, Vienna, Austria
11. J. Phirani*, S. Roy, H. J. Pant, "Predicting Dead Pore-Volume of Pores in a Prous Media from Single Tracer Experiment", International Conference on Application of Radiation Science and Technology, 24-28 Apr, 2017, Vienna, Austria
12. J. Phirani*, "Buried Pipelines for Heavy Oil Transport", Invited Talk, Enviro 2017, 27-28 Feb, 2017, New Delhi, India
13. J. Phirani*, "Exploitation of Fractured Reservoirs – A Lab Scale Approach", Invited Lecture, Upstream R & D Conclave, Lovraj Kumar Memorial Trust, 02-03 Feb, 2017, New Delhi, India
14. V. Singh, J. Phirani*, A. Wagadre, Y. Chandrawat, S. Garg, P. Kishore, "Feasibility of extraction of geothermal energy from a single well in a confined/unconfined reservoir" AGU fall meeting, 12-16 Dec, 2016, San Francisco, CA, USA
15. G. Visavale, S. Ashraf, J. Phirani*, " Imbibition Dynamics in Interacting Capillaries", Petrotech 12th International Oil and Gas Conference, 5-7 Dec, 2016, New Delhi, India
16. S. Ashraf, G. Visavale, S. S. Bhaga, J. Phirani*, Immiscible Displacement in Disordered Interacting Capillaries" Invited short talk, Gordon Research Seminar and Conference, 30 Jul-5 Aug 2016, Girona, Spain
17. J. Phirani*, "Challenges in Enhanced Oil Recovery" Keynote Speaker, Khanij 2015, RGIPT, Rai Bareilly, India.
18. J. Phirani*, "Enhanced Oil Recovery from Fractured Reservoirs", Workshop on Enhanced Oil Recovery, Integrated Operations, Safety, 18-19 Feb 2015, IIT Guwahati, Assam, India.
19. P. Bhade, J. Phirani*, "Gas Production from Unconfined Layered Hydrate Reservoirs", Fiery Ice-9th International Workshop on Methane Hydrate R&D, 10-12 Nov, 2014, Hyderabad, India.
20. P. Bhade, J. Phirani*, "Production Scenarios for Layered Hydrate Reservoirs" International Conference on Gas Hydrate (ICGH 8), 28 Jul-Aug 1, 2014, Beijing, China.
21. P. Bhade, J. Phirani*, "Effect of Geological Layers on Gas Production from Unconfined Hydrate Reservoirs", Gordon Research Conference, 6-11 Jul 2014, Lewiston, ME, USA.

22. J. Phirani, K. K. Mohanty*, "Production from Methane Hydrate Reservoirs", Gordon Research Conference, 6-11 Jul, 2010, Waterville, ME, USA
23. R. K. Jha*, J. Phirani, I. Osaka, M. Kumar, "Effective Length of Horizontal Wells during Primary Production in Heavy Oil Reservoirs", World Heavy Oil Congress, 3-5 Nov, 2009, Puerto La Cruz, Venezuela
24. J. Phirani, K. K. Mohanty*, "Gas Production from Methane Hydrates" invited talk, Aug 24, 2009, ConocoPhillips, Houston, USA
25. J. Phirani, G. J. Hirasaki, K. K. Mohanty* "Gas Production from Unconfined Reservoirs" AGU fall meeting, 15-19 Dec, 2008, San Francisco, CA, USA
26. J. Phirani, G.J. Hirasaki, K.K. Mohanty* "Production Strategies for Marine Hydrate Reservoirs" 6th International Conference on Gas Hydrates, 6-10 Jul, 2008, Vancouver, BC, Canada.