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2016-

Curriculum Vitae

कर्मण्येवाधिकारस्ते मा फलेषु कदाचन। मा कर्मफलहेतुर्भूर्मा ते सङ्गोऽस्त्वकर्मणि।।

EDUCATION

Doctor of Philosophy in Petroleum Engineering: (2016)

UNIVERSITY OF ALBERTA, Edmonton, AB, Canada Topic for Thesis: Characterization of Reservoir Fluids Based on Perturbation from n-Alkanes **Supervisor:** Dr. Ryosuke Okuno

Master of Science in Petroleum Engineering (2009)

UNIVERSITY OF REGINA, Regina, SK, Canada Topic of Thesis: Tuning of Friction Theory to Predict Viscosity of Heavy Oils Supervisor: Dr. Amr Henni, Dr. David deMontigny

Bachelor of Technology in Petroleum Engineering (1997)

INDIAN SCHOOL OF MINES, Dhanbad, India

PROFESSIONAL EXPERIENCE

INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD Professor, Department of Petroleum Engineering

AcademicJobs:

Undergraduate Courses Taught:

- Production System Design:
- Oil and Gas Well Testing
- Instruction to Undergraduate Students on Use of CMG Petroleum Engineering Simulation Softwares (Stars, Imex, Gem, Winprop)

Graduate Courses Taught:

Reservoir Simulation

Advanced Well Testing

Topics Taught in Executive Development Program:

- PVT Experiments and its use in Compositional and Black-Oil Simulation models.
- o Simulation of PVT and Phase Behavior for Reservoir Fluids using Cubic Equation of State
- Reservoir Fluid Properties
- Immiscible Water Drive
- o Introduction to Chemical Enhanced Oil Recovery
- Introduction to Miscible Gas Injection

GAIL (INDIA) LIMITED, New Delhi, India

Deputy Manager (Exploration and Production)

- Drafted techno-economic reports on offer for bidding for the blocks
- Keenly reviewed production history and reservoir data, which included petro-physical, formation evaluation, logging, and fluid properties
- Determined the technical feasibility for improved oil recovery for producing blocks, as well as the possibility of secondary oil recovery
- Tracked the progress of exploration initiatives, such as seismic surveys, seismic data processing, seismic report interpretation, and exploratory wells drilling

GAIL (INDIA) LIMITED, UP, India Deputy Manager (Chemical)

 Commissioned and pre-commissioned liquefied petroleum gas mounded storage, automatic loading control systems, and liquid hydrocarbon dispatch units

2003-2004

2005-2007

Curriculum Vitae

Provided strategic leadership to the operations of integrated off-site plants

GAIL (INDIA) LIMITED, UP, India Senior Engineer (Chemical)

 Handled the installation, pre-commissioning and commissioning of Liquefied Petroleum Gas Mounded Storage, Liquid Hydrocarbon Dispatch Unit, and surrounding pipeline system along with the administration of automatic loading control system.

GAIL (INDIA) LIMITED, UP, India Senior Engineer (Chemical)

- Worked on pipelines pre-commissioning, commissioning, and operation activities.
- Performed study on process flow diagram (PFD), along with process and instrumentation diagram (P&ID)
- Commissioned process vessels, including methane, ethane, ethylene distillation tower, propane, butane plus separation units, ethylene catalytic regeneration units, heat exchangers, pipelines, and control valves
- Made use of automation from centralized control room in running ethylene production unit
- Handled issuance of hot work, cold work, and vessel entry permits

GAIL (INDIA) LIMITED, UP, India	
Graduate Engineer Trainee (Petroleum))

Oversaw the installation of process vessels, which included ethylene distillation tower, methane, ethane, propane, butane plus separation units, ethylene catalytic regeneration units, heat exchangers, pumps, pipe lines, and control valves, training on operation of Hazira-Bijaypur-Jagdishpur (HBJ) pipeline, SCADA system, Bijaypur Gas Compressor Station.

PROFESSIONAL TRAINING

- 1. Workplace Hazardous Materials Information System Training, University of Regina, Canada: 2008
- 2. Laboratory Safety Training, University of Regina: 2008
- 3. Workshop on University Teaching, Centre for Teaching and Learning, University of Regina, Canada: 2007
- 4. Helicopter Underwater Escape and Sea Survival Training, Naval Maritime Academy, Mumbai, India: 2005
- 5. *Project Planning, Monitoring, and Control System,* Indian Society for Training and Development, New Delhi, India: 2005
- 6. *Management Training Program for Young Managers under* "Young GAIL Unlimited, Indian Institute of Management, Kolkata, India: 2004
- 7. Presentation Skills and Public Speaking, GAIL Training Institute, NOIDA, India: 2003

➔ TECHNICAL SKILL

- 1. Commercial Simulation Software: CMG (Gem, Imex, Stars)
- 2. Phase Behaviour Commercial Software: CMG (Winprop), PVTsim, PVTpro
- 3. Programming Language: R, Fortran
- 4. Microsoft Office (Excel, Word, and PowerPoint)

• AWARDS AND HONORS

- 1. Indian School of Mines, Dhanbad Scholarship, 1993-95
- 2. Essar Oil (<u>www.essar.com/</u>) Scholarship, 1995-1997
- 3. University of Regina, Graduate Research Scholarship, 2008
- 4. University of Regina, Research Assistantship, 2008
- 5. Graduate Recruitment Scholarship, University of Alberta (2011-12)
- 6. Graduate Recruitment Scholarship, University of Alberta (2012-13)
- 7. Union Pacific Resource Inc. Canadian Graduate Scholarship, University of Alberta (2013-14)

2000-2003

1998-2000

1997-1998



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TEACHING ASSISTANTSHIP

The job mainly included marking the home assignments, explaining answers of the assignments to students, assisting course instructor in conducting examinations, and in the class room (if required). I acted as Teaching Assistant for following courses:

- 1. Applied Reservoir Engineering, University of Regina, 2007
- 2. Well Logging and Formation Evaluation, University of Regina, 2010
- 3. Petroleum Waste Management, University of Regina, 2010
- 4. Advanced Topics in Petroleum Production Mechanics, University of Alberta, 2011
- 5. Advanced Reservoir Engineering, University of Alberta, 2011
- 6. Modeling in Petroleum Engineering, University of Alberta, 2012, 2014

PUBLICATIONS

Journal Papers

- Mishra, A. K. and **Kumar, A.** (2019) P-μ-T cubic equation of viscosity for hydrocarbons. *Fluid Phase Equilibria*, 505,112359 (Impact Factor: 2.514)
- Mishra, A. K. and **Kumar**, A. (2019) Modified Guo Viscosity Model for Heavier Hydrocarbon Components and Their Mixtures. *Journal of Petroleum Science and Engineering*, 182, 106248. Impact Factor: 2.886)
- Jhalendra, R. K. and **Kumar, A.** (2018) Thermodynamically Consistent Criteria for Developing Reliable Equation of State Model for Compositional Simulation. *Fuel*, 234, 770-784. (Impact Factor: 5.128)
- Kumar, A. and Okuno, R. (2016) Reliable characterization of bitumen based on perturbation from n-alkanes for steam-solvent coinjection simulation. *Fuel*, 182, 141-153. (Impact Factor: 5.128)
- **Kumar, A.** and Okuno, R. (2016) A New Algorithm for Multiphase Fluid Characterization for Solvent Injection. *SPE J*, 1-17 (Impact Factor: 3.095)
- Kumar, A. and Okuno, R. (2015). Direct Perturbation of the Peng-Robinson Attraction and Covolume Parameters for Reservoir Fluid Characterization. *Chemical Engineering Science*, 127, 293-309. (Impact Factor: 3.372)
- Kumar, A. and Okuno, R. (2014). Reservoir Oil Characterization for Compositional Simulation of Solvent Injection Processes. *Industrial and Engineering Chemistry Research*, 53, 440-455. (Impact Factor: 3.375)
- Kumar, A. and Okuno, R. (2013). Characterization of Reservoir Fluids using an EOS based on Perturbation from n-Alkanes. *Fluid Phase Equilibria*, 358, 250-271. (Impact Factor: 2.514)
- Kumar, A. and Henni, A. (2013). A Unique Approach to Predict Accurate Heavy Oil Density with New Three Parameter Cubic Equation of State. *Canadian Journal of Chemical Engineering*, 91, 391-398. (Impact Factor: 1.61)
- **Kumar, A.** and Okuno, R. (2012). Critical Parameters Optimized for Accurate Phase Behavior Modeling for Heavy n-Alkanes up to C₁₀₀ using the Peng–Robinson Equation of State. *Fluid Phase Equilibria*, 335, 46-59. (Impact Factor: 2.514)
- Kumar, A. and Henni, A. (2011). Three Parameter Cubic Equation of State for Pure Components of Heavy oils. *Canadian Journal of Chemical Engineering*, 89, 869-878. (Impact Factor: 1.61)
- Kumar, A., Henni, A., and Shirif, E. (2011). Heavy Oil Viscosity Modeling with Friction Theory. *Energy & Fuels*, 25, 493-498. (Impact Factor: 3.021)

Manuscript Under Review

- Jhalendra, R. K. and Kumar, A. (2020) A Study on the Lowest Gibbs Free Energy Criteria for Developing a Reliable Equation of State Model for Compositional Simulation, *Chemical and Engineering Sciences*
- Kumar, A., and Upadhyay, R. (2020) A New Two-Parameters Cubic Equation of State with Benefits of Three-Parameters, *Chemical and Engineering Sciences*.

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Conference Papers

- Kumar, A. and Okuno, R. (2015). *Characterization of Three-Hydrocarbon-Phase Behavior by Use of a Cubic EOS for Solvent Injection Processes*. Presented at Society of Petroleum Engineering Annual Technical Conference and Exhibition 2015, September 28-30, 2015. Houston, Texas, USA.
- Kumar, A. and Okuno, R. (2013). Universal Fluid Characterization Using an EOS Based on Perturbation from n-Alkanes. Presented at Society of Petroleum Engineering Annual Technical Conference and Exhibition 2013, September 30-3 October 2013, New Orleans, Louisiana, USA.
- Kumar, A. and Okuno, R. (2012). *Fluid Characterization Using an EOS for Compositional Simulation of Enhanced Heavy-Oil Recovery*. Presented at Society of Petroleum Engineering Annual Technical Conference and Exhibition 2012, October 8-10 2012, San Antonio, Texas, USA.
- Kumar, A., Henni, A. and Shirif, E. (2010). *New Tuning Method to Improve Viscosity Prediction of Heavy Oils*. Poster presentation in 11th International Conference on Petroleum Phase Behavior and Fouling schedule from June 13-17 2010 (Petrophase XI-2010), Jersey City, USA. (Note: No paper)

CRESEARCH INTERESTS

- o Reservoir Rock and Fluid Characterization
- Compositional Flow Simulation
- Multiphase Behaviour PVT and Thermodynamics
- Near Critical Phase Behaviour for system with multiple phases
- o Enhanced Oil Recovery: Miscible Gas Injections, Steam-Solvent Coinjection
- Equation of State and applications
- o Unconventional Hydrocarbon Resources: Shale Gas and Coal Bed Methane
- o Big Data Analytics

TEACHING INTERESTS

- Reservoir Engineering
- Reservoir Fluid Properties
- Artificial Lift System (including design)
- Production Engineering
- Oil and Gas Well Testing
- o Surface Oil and Gas Operation System (including design)
- Immiscible Water/Gas Injection
- o PVT Experiments and Phase Behaviour
- Reservoir Simulation
- o Enhanced Oil Recovery: Secondary Oil Recovery, Miscible Gas Injection, Thermal Methods

PROFESSIONAL AFFILIATIONS

- [1] Society of Petroleum Engineers
- [2] Golden Key International Honor Society

ACTIVITIES

Reviewer for following journals:

Canadian Journal of Chemical Engineering, Journal of Natural Gas and Engineering, Fuel, Society of Petroleum Engineering Journal, Chemical Engineering Science, Chinese Journal of Chemical Engineering, Journal of Energy Resource Technology, Petroleum Sciences and Technology.