

## **Li Xiangfang**

### **Ph.D., Professor**

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### **Education**

Ph.D., Petroleum Engineering, China University of Petroleum (China), 1992

M.S., Petroleum Engineering, China University of Petroleum at East China, 1988

B.S., Petroleum Engineering, Huadong University of Petroleum, 1982

### **Research Areas and Interests**

Conventional Gas Reservoir Engineering

Unconventional Gas Reservoirs Development Engineering (Coal-Bed Methane, Tight Gas, Tight Oil, and Shale Gas Reservoirs)

Reservoir Engineering

Well Control and Safety

Well Testing

### **Teaching**

Gas Reservoir Engineering,

Gas-Liquid Two Phase Flow Theory,

Multi-phase Flow Theory

### **Professional Experiences**

1982.01-1989.09, Lecturer, Department of Petroleum Engineering, China University of Petroleum at Southeast.

1992.11-now, Professor, Department of Petroleum Engineering, China University of Petroleum (Beijing)

1999.5-1999.10, Visiting Scholar, the Agricultural and Mechanical College of Texas.

### **Other Appointments**

Head person of the gas reservoir engineering teaching team

Vice chairman of natural gas committee of Chinese Petroleum Society

Director of Beijing petroleum society and chairman of petroleum engineering committee

Multi-phase flow committee member of Chinese Thermophysics Engineering Society

Advisory specialist in the State Administration of Work Safety (SAWS)

Members, editorial boards for more than 10 journals, such as Petroleum Exploration and Development,

Acta Petrolei Sinica, Petroleum Knowledge, Journal of China University of Petroleum, Petroleum Science, Journal of Hydrodynamics, Natural Gas Industry, Oil Drilling & Production Technology, Petroleum Drilling Techniques, Well Testing and so on.

### **Other Professional Affiliations**

Society of Petroleum Engineers

Chinese Petroleum Society

Beijing petroleum society  
Chinese Thermophysics Engineering Society  
The State Administration of Work Safety (SAWS)

### **Honors and Awards**

1. National award for energy science and technology progress, 2013
2. Award for energy science and technology progress of the Ministry of Education, 2007
3. Award for energy science and technology progress of Beijing, 2007

### **Selected Publications**

1. Li Xiangfang, Shi Juntai, Du Xiyao, et al., Transport mechanism of desorbed gas in coalbed methane reservoirs. *Petroleum Exploration and Development*. 2012, 39(2):203-213.
2. Li Xiangfang, Pu Yunchao, Sun Changyu et al., Recognition of absorption/desorption theory in coalbed methane reservoir and shale gas reservoir [J]. 2014, 35(6), 1113-1129.
3. Wu, Keliu, Chen, Zhangxin. Li, Xiangfang, et al., Wettability effect on nanoconfined water flow: A simple model. *PNAS*. 2017, 114 (13), 3358-3363.
4. Keliu Wu, Zhangxin Chen, Xiangfang Li, Jinze Xu, Jing Li, Kun Wang, Heng Wang, Shuhua Wang, Xiaohu Dong, Flow behavior of gas confined in nanoporous shale at high pressure: Real gas effect, *Fuel*, Volume 205, 2017, 173-183,
5. Jing Li, Xiangfang Li, Keliu Wu, Dong Feng, Tao Zhang, Yifan Zhang, Thickness and stability of water film confined inside nanoslits and nanocapillaries of shale and clay, *International Journal of Coal Geology*, Volume 179, 2017, Pages 253-268.
6. Tianyi Zhao, Xiangfang Li, Zhengfu Ning, Huawei Zhao, Meifen Li, Molecular simulation of methane adsorption on type II kerogen with the impact of water content, *Journal of Petroleum Science and Engineering*, 2018,161:302-310,
7. Feng,Dong. Li, Xianfang. Wang, Xiangzeng, et al. Capillary filling under nanoconfinement: The relationship between effective viscosity and water-wall interactions, *International Journal of Heat and Mass Transfer*, 2018.118: 900–910.
8. Yanan Miao, Xiangfang Li, John Lee, Yunjian Zhou, Keliu Wu, Zheng Sun, Songxia Liu, A new rate-decline analysis of shale gas reservoirs: Coupling the self-diffusion and surface diffusion characteristics, *Journal of Petroleum Science and Engineering*, 2018, 163, 166-176.
9. Zheng Sun, Xiangfang Li, Juntai Shi, Tao Zhang, Dong Feng, Fengrui Sun, Yu Chen, Jiucheng Deng, Liujie Li. A semi-analytical model for the relationship between pressure and saturation in the CBM reservoirs, *ournal of Natural Gas Science and Engineering*,2018,365-375.
10. Sun Zheng, Li Xiangfang, Shi Juntai, et al. Apparent permeability model for real gas transport through shale gas reservoirs considering water distribution characteristic[J]. *International Journal of Heat & Mass Transfer*, 2017, 115:1008-1019.
11. Tao Zhang, Xiangfang Li, Zheng Sun, Dong Feng, Yanan Miao, Peihuan Li, Zenghua Zhang, An analytical model for relative permeability in water-wet nanoporous media, *Chemical Engineering Science*, Volume 174, 2017, 1-12
12. Tianyi Zhao, Xiangfang Li, Huawei Zhao, Meifen Li. Molecular simulation of adsorption and thermodynamic properties on type II kerogen: Influence of maturity and moisture content [J]. *Fuel*, 2017, 190: 198–207.

13. Bingxiang Xu, Xiangfang Li, Weina Ren, Dong Chen, Ling Chen, Yuhu Bai. Dewatering rate optimization for coal-bed methane well based on the characteristics of pressure propagation [J]. *Fuel*, 2017, 188:11-18.
14. Li Jing, Li Xiangfang, Wang Xiangzeng, Li Yingying, Wu Keliu, Shi Juntai, Yang Liu, Feng Dong, Zhang Tao and Yu Pengliang. Water distribution characteristic and effect on methane adsorption capacity in shale clay [J]. *International Journal of Coal Geology*, 2016, 159(4):135-154.
15. Jing Li, Xiangfang Li, Keliu Wu, Xiangzeng Wang, Juntai Shi, Liu Yang, Hong Zhang, Zheng Sun, Rui Wang, and Dong Feng. Water Sorption and Distribution Characteristics in Clay and Shale: Effect of Surface Force [J]. *energy&fuel* 2016, 30(11).
16. Jian Yang, Xiangfang Li, Zhangxin Chen, Ji Tian, Xinguang Liu, and Keliu Wu. Combined Steam–Air Flooding Studies: Experiments, Numerical Simulation, and Field Test in the Qi-40 Block [J]. *Energy & Fuels*, 2016, 30(3).
17. Keliu Wu, Zhangxin Chen, Xiangfang Li, Chaohua Guo, Mingzhen Wei. A model for multiple transport mechanisms through nanopores of shale gas reservoirs with real gas effect–adsorption-mechanic coupling [J]. *International Journal of Heat & Mass Transfer*, 2016, 93:408-426.
18. Wu, Keliu, Li, Xiangfang, Guo, Chaohua, Wang, Chenchen, Chen, Zhangxin. A Unified Model for Gas Transfer in Nanopores of Shale-Gas Reservoirs: Coupling Pore Diffusion and Surface Diffusion [J]. *SPE Journal*, 2016.
19. Yanzun Li, David DiCarlo, Xiangfang Li, Jiali Zang, Zhennan Li. An experimental study on application of nanoparticles in unconventional gas reservoir CO<sub>2</sub> fracturing [J]. *Journal of Petroleum Science & Engineering*, 2015, 133:238-244.
20. Juntai Shi, Zheng Sun, Xiangfang Li. Analytical Models for Liquid Loading in Multifractured Horizontal Gas Wells [J]. *Spe Journal*, 2015.
21. Wu, Keliu, Li, Xiangfang, Wang, Chenchen, Chen, Zhangxin and Wei Yu. A model for gas transport in microfractures of shale and tight gas reservoirs [J]. *Aiche Journal*, 2015, 61(6):2079-2088. (SCI,
22. Keliu Wu, Xiangfang Li, Chenchen Wang, Wei Yu, and Zhangxin Chen. Model for surface diffusion of adsorbed gas in nanopores of shale gas reservoirs, *Ind. Eng. Chem. Res.* 54 (12) (2015) 3225–3236.
23. Keliu Wu, Zhangxin Chen, Xiangfang Li. Real gas transport through nanopores of varying cross-section type and shape in shale gas reservoirs, *Chemical Engineering Journal* 281 (2015) 813-825.
24. Juntai Shi, Xiangfang Li, Shiqing Cheng, Jianrui Zhou, Bo Gao. A new approach for evaluating well deliverability in ultra-thick gas reservoirs [J]. *Journal of Petroleum Science & Engineering*, 2015, 133:869-880.
25. Juntai Shi, Liang Huang, Xiangfang Li, Kamy Sepehrnoori. Production forecasting of gas condensate well considering fluid phase behavior in the reservoir and wellbore [J]. *Journal of Natural Gas Science & Engineering*, 2015, 24:279-290.
26. Fanliao Wang, Xiangfang Li, Gary Couples, Juntai Shi, Jinfen Zhang, Yanick Tepinhi, Ling Wu. Stress arching effect on stress sensitivity of permeability and gas well production in Sulige gas field [J]. *Journal of Petroleum Science & Engineering*, 2015, 125:234-246.
27. Suntai Shi, Xiangfang Li, Qian Li, Fanliao Wang, Kamy Sepehrnoori. Gas permeability model considering rock deformation and slippage in low permeability water-bearing gas reservoirs [J]. *Journal of Petroleum Science & Engineering*, 2014, 120(8):61-72.
28. Yuansheng Li, Xiangfang Li, Sainan Teng, Darong Xu. Improved models to predict gas–water relative permeability in fractures and porous media [J]. *Journal of Natural Gas Science & Engineering*, 2014, 19(7):190-201.
29. Yuansheng Li, Xiangfang Li, Sainan Teng, Fanliao Wang, Darong Xu. A new changing wellbore storage model for pressure oscillation in pressure buildup test [J]. *Journal of Natural Gas Science & Engineering*, 2014, 19(19):350–357.

30. Bangtang Yin, Xiangfang Li, Baojiang Sun, Hongquan Zhang. Hydraulic model of steady state multiphase flow in wellbore annuli [J]. *Petroleum Exploration & Development*, 2014, 41(3):399–407.
31. KeLiu Wu, Xiangfang. Li, P. Yang, S. Zhang. The Establishment of a Novel Deliverability Equation of Abnormal Pressure Gas Reservoirs Considering a Variable Threshold Pressure Drop [J]. *Petroleum Science & Technology*, 2014, 32(32):15-21.
32. Bingxiang Xu, Manouchehr Haghighi, Xiangfang Li, Dennis Cooke. Development of new type curves for production analysis in naturally fractured shale gas/tight gas reservoirs [J]. *Journal of Petroleum Science & Engineering*, 2013, 105(1):107–115.
33. Bingxiang Xu, Xiangfang Li, Manouchehr Haghighi, Weina Ren, Xiyao Du, Dong Chen, Yuyang Zhai. Optimization of hydraulically fractured well configuration in anisotropic coal-bed methane reservoirs [J]. *Fuel*, 2013, 107(9):859-865.
34. Bingxiang Xu, Xiangfang Li, Manouchehr Haghighi, Xiyao Du, Xinzhou Yang, Dong Chen, Yuyang Zhai. An analytical model for desorption area in coal-bed methane production wells [J]. *Fuel*, 2013, 106(2):766–772.
35. Keliu. Wu, Xiangfang. Li, B. Yan, M. Ren. Predicting the Method of Oil Recovery in the Gas-assisted Gravity Drainage Process [J]. *Petroleum Science & Technology*, 2013, 31(23):2527-2533.
36. KeLiu. Wu, Xiangfang. Li, B. Yan, J. Shi, Q. Li. Research on a Computational Method for Reservoir Pressure of a Water-Drive Condensate Gas Reservoir [J]. *Petroleum Science & Technology*, 2013, 31(17):1744-1751.
37. KeLiu Wu, Xiangfang. Li. A New Method to Predict Water Breakthrough Time in an Edge Water Condensate Gas Reservoir Considering Retrograde Condensation [J]. *Petroleum Science & Technology*, 2013, 31(17):1738-1743.
38. Keliu Wu, Xiangfang Li, Haitao Wang, Wenlong Guan, Xing Wang, Zongbao Liao, Wuguang Li. A quantitative model for evaluating the impact of volatile oil non-equilibrium phase transition on degassing [J]. *Petroleum Exploration & Development*, 2012, 39(5):636-643.
39. Xiangfang Li, Juntai Shi, Xiyao Du, Aimei Hu, Dong Chen, Dongling Zhang. Transport mechanism of desorbed gas in coalbed methane reservoirs [J]. *Petroleum Exploration & Development*, 2012, 39(2):218–229.
40. Li, Jing, Li, Xiangfang, Wang, Rui, Zhang, Kai, Wu, Keliu, Shi, Juntai, Xia, Jun, Xin, Yinan, Liu, Dunqing, Miao, Yanan, Jiang, Mingjie, Ge, Zimo, Water Sorption and Distribution Characteristics inside Shale Nano-capillaries and Nano-channels: Effect of Surface Force Interactions[C]// *Unconventional Resources Technology Conference*, 1-3 August, San Antonio, Texas, USA. 2016, SPE- 2461269-MS.
41. Feng Dong, Li Xiangfang, Li Jing, Zhang Kai, Miao Yanan, Shi Juntai, Sun Zheng, Zhang, Tao, Li Peihuan, Liu Dunqing. Investigation of Gas-Water Distribution Characteristics in Kerogen Pores: A View of Intermolecular Surface Force[C]. *Unconventional Resources Technology Conference*, 1-3 August, San Antonio, Texas, USA.2016,SPE-2460981-MS
42. Xia, Jun, Li, Xiangfang, Zang, Jiali, Zhou, Tong, Li, Jing, China Bai, Jie,Jiang, Mingjie, Zhang, Zenghua, Chen, Yu,.Simulation Study of Foam Displacement at Pore and Reservoir Scale[C]// *International Petroleum Technology Conference*, 14-16 November, Bangkok, Thailand. 2016, SPE- 18906-MS.
43. Zhao Tianyi, Li Xiangfang, Zhao H, et al. Micro-storage State and Adsorption behavior of Shale Gas[C]// *SPE Nigeria Annual International Conference and Exhibition*, 4-6 August, Lagos, Nigeria. 2015,SPE- 178386-MS
44. Yang Jian, Li Xiangfang, Xu D, et al. Research of Enhancing Heavy Oil Recovery By Steam-Air Combination Flooding[C]// *SPE/IATMI Asia Pacific Oil & Gas Conference and Exhibition*, 20-22 October, Nusa Dua, Bali, Indonesia. 2015, SPE- 176424-MS
45. Xu Darong, Li Xiangfang, Li Y, et al. A Two-Phase flow Model to Predict Liquid Holdup and Pressure Gradient of Horizontal well[C]// *SPE/IATMI Asia Pacific Oil & Gas Conference and Exhibition*, 20-22 October, Nusa Dua, Bali, Indonesia. 2015. SPE- 176229-MS

46. Zang Jia, Li Xiangfang, Chen Z, et al. An Analytical Model of Foam Resistance Factor in Gas Foam Flooding[C]// SPE Nigeria Annual International Conference and Exhibition, 4-6 August, Lagos, Nigeria. 2015.SPE- 178339-MS
47. Li Yanzun, Li Xiangfang, Zang J, et al. Improving the CO<sub>2</sub> Fracturing Effect with Nanoparticles in Shale Gas Reservoir Stimulation[C]// SPE Nigeria Annual International Conference and Exhibition, 4-6 August, Lagos, Nigeria. 2015.SPE- 178343-MS.
48. Li Jing, Li Xiangfang et al. Water Distribution Characteristic and Effect on Methane Adsorption Capacity in Shale Clays[C]// SPE Asia Pacific Unconventional Resources Conference and Exhibition, 9-11 November, Brisbane, Australia, 2015 SPE- 176965-MS.
49. Wu keliu, Li Xiangfang, Guo C, et al. Adsorbed Gas Surface Diffusion and Bulk Gas Transport in Nanopores of Shale Reservoirs with Real Gas Effect-Adsorption-Mechanical Coupling[C]// SPE Reservoir Simulation Symposium, 23-25 February, Houston, Texas, USA. 2015.SPE- 173201-MS
50. Li Jing, Li Xiangfang, Li Y, et al. Mechanism of Liquid-Phase Adsorption and Desorption in Coalbed Methane Systems - A New Insight into an Old Problem[C]// SPE Asia Pacific Unconventional Resources Conference and Exhibition, 9-11 November, Brisbane, Australia. 2015.SPE- 177001-MS.
51. Keliu Wu, Xiangfang Li, Chenchen Wang, Wei Yu, Zhangxin Chen , A Model for Surface Diffusion of Adsorbed Gas in Nanopores of Shale Gas Reservoirs[C]// Offshore Technology Conference, 04-07 May, Houston, Texas, USA,2015, OTC-25662-MS.
52. Wu K, Chen Z, Wang H, Xiangfang Li, Shi Juntai, et al. A Model for Real Gas Transfer in Nanopores of Shale Gas Reservoirs[C]// EUROPEC 2015, 01-04 June, Madrid, Spain. 2015. SPE-174293-MS.
53. Keliu Wu, Xiangfang Li, Chenchen Wang, et al. A Model for Gas Transport in Micro Fractures of Shale and Tight Gas Reservoirs[C]// SPE/CSUR Unconventional Resources Conference, 20-22 October, Calgary, Alberta, Canada, 2015, SPE-175906-MS.
54. J Shi, X He, F Sun, W Yu, Xiangfang Li. A New Analytical Model for Liquid Loading in Shale Gas Reservoirs[C]// Unconventional Resources Technology Conference, 25-27 August, Denver, Colorado, USA 2014, SPE- 1922861-MS.
55. K Wu, Xiangfang Li, C Wang, W Yu, Z. Chen. Apparent Permeability for Gas Flow in Shale Reservoirs Coupling Effects of Gas Diffusion and Desorption[C]// Unconventional Resources Technology Conference, 25-27 August, Denver, Colorado, USA.2014 SPE- 1921039-MS.
56. Li Yuansheng, Li Xiangfang, Shi J, et al. The Analysis and Interpretation of Parameters on Well Performance of Low Permeability Water-Producing Reservoirs:a Case Study of Daniudi Gas Field[C]// SPE Energy Resources Conference, 9-11 June, Port of Spain, Trinidad and Tobago, 2014, SPE- 169938-MS.
57. Li Yuansheng, Li Xiangfang, Shi J, et al. A Nano-Pore Scale Gas Flow Model for Shale Gas Reservoir[C]// SPE Energy Resources Conference, 9-11 June, Port of Spain, Trinidad and Tobago, 2014.SPE- 169939-MS
58. Xiangfang Li, Meipeng Ren. Risk Ranking and Well Control Measures of Drilling Blowout[C]// SPE Americas E&P Health, Safety, Security and Environmental Conference, 18-20 March, Galveston, Texas, USA, 2013.SPE- 163736-MS.
59. Xu Bignxiang, Li Xiangfang, Xu H, et al. A Simplified Model for Desorption Area Prediction in Coalbed Methane Reservoir[C]// SPE Asia Pacific Oil and Gas Conference and Exhibition, 22-24 October, Jakarta, Indonesia. 2013.SPE- 165797-MS
60. Ren Meipeng, Li Xiangfang, Shi F, et al. The Research Of Seabed Rescue Equipment And Method Of Uncontrolled Blowout In Offshore Drilling[C]// IADC/SPE Asia Pacific Drilling Technology Conference and Exhibition, 9-11 July, Tianjin, China . 2012,.SPE- 156435-MS.

61. Xu Bignxiang, Haghghi M, Cooke D, Li Xiangfang. Production Data Analysis in Eagle Ford Shale Gas Reservoir[C]// SPE/EAGE European Unconventional Resources Conference and Exhibition, 20-22 March, Vienna, Austria. 2012.SPE- 153072-MS
62. Zhang, Qinghui, Li Xiangfang, Song Z, et al. A Prediction of Water Breakthrough Time in Low Permeability Gas Reservoirs With Bottom Water[J]// SPE Asia Pacific Oil and Gas Conference and Exhibition, 20-22 September, Jakarta, Indonesia. 2011.SPE- 147873-MS
63. Wu K, Li Xiangfang, Zhai Y. The Model for Predicting Stream Breakthrough Timing during Steam Drive Development of Heavy Oil Reservoirs[C]// SPE Heavy Oil Conference and Exhibition, 12-14 December, Kuwait City, Kuwait, 2011.SPE- 150504-MS.