Fansheng Xiong

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Date of Birth: September. 1991

Research Interests: Modelling and computing based on machine learning; Applied mathematics

Education

- **07/2020−06/2022** **Postdoc** in Mathematics
  Institute of Applied Physics and Computational Mathematics, Beijing
- **09/2016−06/2020** **Ph.D.** in Applied Mathematics
  Institute for Advanced Study, Tsinghua University
- **09/2013−06/2016** **M.S.** in Geological Engineering
  China University of Geosciences (Beijing), Joint M.S. student with Tsinghua University
- **09/2009−06/2013** **B.S.** in Geological Engineering
  School of Engineering and Technology, China University of Geosciences (Beijing)

Publications

1. **Fansheng Xiong**, Wen-An Yong, 2022. Learning stable seismic wave equations from actual observable data. ***Geophysical Journal International***, 230(1), 349-362.
2. **Fansheng Xiong,** Jiawei Liu, Zhenwei Guo, et al., 2022. Deep-Neural-Networks-based Approaches for Biot-Squirt Model in Rock Physics. ***Acta Geophysica***, 70, 593-607.
3. **Fansheng Xiong**, Jing Ba, Davide Gei, José M. Carcione, 2021. Data-driven design of wave-propagation models for shale-oil reservoirs based on machine learning. ***Journal of Geophysical Research: Solid Earth.*** 126, e2021JB022665.
4. **Fansheng Xiong**, Heng Yong, Han Wang, et al., 2021. Biot's equations-based reservoir parameter inversion using deep neural networks. ***The Journal of Geophysics and Engineering***, 18(6), 862-874.
5. **Fansheng Xiong**, Jiawei Liu, Zhenwei Guo, et al., 2021. Stability analysis-based reformulation of wave equations for poro-elastic media saturated with two fluids, ***Geophysical Journal International***, 226(1): 327−344.
6. **Fansheng Xiong**, Jiawei Liu, Zhenwei Guo, et al., 2021. Wave equations of porous media saturated with two immiscible fluids based on the volume averaging method. ***Frontiers in Earth Sciences***, 9: 618909.
7. **Fansheng Xiong**, Lideng, Gan, Weitao Sun, et al., 2021. Characterization of reservoir permeability and analysis of influencing factors in fracture-pore media. Chinese Journal of

Geophysics (in Chinese), 64(1): 279-288.

8. **Fansheng Xiong**, Weitao Sun, Jing Ba, José M. Carcione, 2020. Effects of fluid rheology and pore connectivity on rock permeability based on a network model. ***Journal of Geophysical Research: Solid Earth,*** 125(3), e2019JB018857.
9. **Fansheng Xiong**, Weitao Sun, Jiawei Liu, 2020. The stability of poro-elastic wave equations in saturated porous media, ***Acta Geophysica***, 69, 65−75.
10. **Fansheng Xiong**, Philip Wang, Corey O'Hern, et al. Comparison of shear and compression jammed packings of frictional disks, ***Granular Matter,*** 2019, 21: 109.
11. Weitao Sun, **Fansheng Xiong**, Jing Ba, et al. Effects of ellipsoidal heterogeneities on wave propagation in partially saturated double-porosity rocks. ***Geophysics***, 2018, 83(3): WC71−82.
12. Hao Yang, Xiaoqiao Gao, **Fansheng Xiong**, et al., Temperature simulation and optimization design of electric heater for in-situ oil shale heating[J], ***Oil Shale***, 2014, 31(2): 105-120.
13. **Fansheng Xiong**, Rongxian Li, Xiaoqiao Gao, et al., An improved L_1-norm adaptive multiple subtraction method based on non-causal matching filter[J] (in Chinese), ***Computing Techniques for Geophysical and Geochemical Exploration***, 2015, 37(2): 215-223.
14. **Fansheng Xiong**, Xinwu Huang, Di Zhang, et al., Adaptive multiple subtraction method based on hybrid L1/L2 norm[J] (in Chinese), ***Geophysical and Geochemical Exploration***, 2014, 38(5): 996-1002.
15. **Fansheng Xiong**, Xinwu Huang, Xiaoqiao Gao, et al., Adaptive multiple subtraction using L1-norm and the application analysis[J] (in Chinese), ***Computing Techniques for Geophysical and Geochemical Exploration***, 2014, 36(1): 80-86.

Research Experiences

- **07/2020−present**

  Study on surrogate model establishing method using deep neural network; Geophysical modeling based on deep neural network; Solving Euler equations based on physics-informed neural network (PINN), a gradient-weighted method was proposed to improve the prediction precision.

- **09/2016−06/2020**

  Theoretical study on wave equations of complex porous media saturated with fluid(s) based on volume average method. The stability of the equation is analyzed from the mathematical point of view, and a new model is derived; The finite difference method solves the equation and carries out seismic attribute prediction.

- **06/2014−08/2016**

  Establishment of wave propagation model in tight reservoir under the condition of low porosity and low permeability, considering non-Darcy fluid flow and non-Newtonian fluid. Numerical simulation of wave equation by finite difference method.

- **05/2011−06/2013**

  Adaptive multiple waves attenuation technique based on Surface Related Multiple Elimination (SRME) method.

Awards

- The first prize of Mathematics Competition for College Students of China in 2011
- The first prize of Mathematics Competition for College Students of Beijing in 2011

- The second prize of Mathematical Modeling Competition for College Students of China in 2012
- The first class scholarship for outstanding students
- The science/technology innovation pacemaker of China University of Geosciences in 2013
- Outstanding graduates of Beijing in 2013 and 2016; Outstanding student cadres in 2015
- The geological scholarship of China Aviation Exploration Institute in 2014
- The excellent paper award for students of Annual Meeting of Chinese Geoscience Union in 2015, 2016 and 2018

Major courses

- **Doctoral courses:** Advanced numerical analysis, Numerical solution of partial differential equation, Asymptotic methods in mathematical physics, Non-equilibrium thermodynamics.
- **Master courses:** Numerical analysis, Geophysical information processing, Seismic data processing and interpretation, Geophysical inversion theory, Plate tectonics, Sequence stratigraphy, New progress of exploration technology, English for geology.
- **Undergraduate courses:** Calculus, Linear algebra, Probability theory and mathematical statistics, Introduction of earth science, Theoretical mechanics, Mechanics of materials, Fluid mechanics, Elastic mechanics, Soil mechanics, Comprehensive geology, Engineering geology, Drilling fluid technology, mathematical modeling, geophysical prospecting, Principle of seismic exploration, Geophysics, Seismic wave propagation theory.

Skills and Certificates

- Skilled in Microsoft Office and MATLAB software. Certificates of National Computer Rank Examination: C Language Band 2, C++ Language Band 2, Network Technique Band 3.
- Certificates of College English Test(China) Band 4 and Band 6. Received the education of TOEFL training, skilled in English reading and writing.
- Be able to bear the hardship of scientific research, with well learning ability, mentality of modest and unpretentious.