Open Positions for Doctoral Aspirants and Post-Doctoral Researchers

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Three Open Positions for Doctoral Aspirants and Post-Doctoral Researchers

Mewbourne College of Earth & Energy at University of Oklahoma invites applications for 3 Doctoral Aspirants and Post-Doctoral Researchers. The doctoral research will be supervised by Dr. Siddharth Misra, Assistant Professor. The project is being supported by the Department of Energy Geosciences Research Office. The start date for these positions is Jan 15, 2019. The positions will be funded for next 3 to 4 years.

Project Title

Quantification of the Crack Evolution Process by Extracting Relevant Signal Components from Wave Propagation and Diffusive Transport Front Measurements

Project Description

The dynamical behavior of fractures in the earth’s subsurface influences key processes that govern the extraction of energy resources and isolation of energy wastes in the shallow crust. Fracture evolution depends on complex interactions involving mineralogy, pore structure, rock fabric, effective mechanical moduli, fluid saturation, and pre-existing microcracks in the rock, and also on the strain rate and the thermal, chemical, and stress history. Such complexities and heterogeneities are subject to substantial uncertainties, often precluding the direct translation of fracture evolution into reductionist physical models. This project will use new geophysical signals and develop new machine learning/deep learning algorithms that produce fresh mathematical/statistical frameworks describing crack evolution and that create and inform improved micromechanical models that can be used to understand and predict how fracture networks respond to external perturbations, such as those resulting from fluid injection or extraction, under shallow crustal conditions.

Duration: 3 - 4 years

Start Date: Jan 2019
Research Position 1

Objective: Measurement and quantification of fracture/crack evolution process

Desired Skills:

- Laboratory measurements: fractures, cracks, acoustic sensing, wave propagation, pressure diffusion, stress-strain relation, CT/SEM imaging
- Laboratory data analysis

Research Position 2

Objective: Simulation of wave propagation and diffusive transport phenomena

Desired Skills:

- Numerical modeling and validation
- Finite difference and finite element methods

Research Position 3

Objective: Pattern recognition, machine learning, and signal processing

Desired Skills:

- Machine learning: clustering, neural network, classification
- Model training, testing, and deployment

Next Steps

If you are interested, mail misra@ou.edu the following:

- Curriculum vitae
- 1 sample research paper/writing
- 1 document containing short answers to the following questions:
  - Which one the 3 open PhD positions will best suit you and why?
  - Give an example of your research accomplishment.
  - Give an example of your creative problem-solving skills.
  - Give an example of your determination to solve challenging problems.
Principal Investigator

Dr. Siddharth Misra is assistant professor in the Mewbourne College of Earth and Energy at the University of Oklahoma, USA. He graduated with a Ph.D. in petroleum engineering from the University of Texas at Austin, USA. Dr. Misra has more than 45 publications in peer-reviewed journals and as part of the conference proceedings. He is serving as an associate editor of the SPE Reservoir Evaluation and Engineering Journal. He has 8 provisional patent applications related to subsurface characterization.

Recent Accomplishments

- Department of Energy Early Career Award with 5-Year Research Funding
- American Chemical Society New Investigator Award with 2-Year Research Funding
- SPE Mid-Continent Formation Evaluation Award

Recent Press Release

- [https://www.energy.gov/articles/department-energy-selects-84-scientists-receive-early-career-research-program-funding](https://www.energy.gov/articles/department-energy-selects-84-scientists-receive-early-career-research-program-funding)
- [http://www.ou.edu/mcee/MCEE_News/Misra_DOE_Award](http://www.ou.edu/mcee/MCEE_News/Misra_DOE_Award)

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