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Joint Seminar

Designing an Evolutionary Optimization Algorithm to Characterize Naturally Fractured Oil Reservoirs

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Raman Auditorium, Department of Physics, University of Pune

Abstract • Well test analysis is widely used to characterize reservoirs of oil and water. This characterization is performed to find, through the solution of an optimization problem, the properties of the porous media, which allow us to simulate the flux and forecast production. Here, we will work with a recent triple porosity model, that considers matrix, fractures and vugulus of the porous media. Due to the shape of the objective data fitting function (well test data), typical gradient based methods may fail to find the optimal solution. In this case, an Evolutionary Optimization Algorithm can be designed taking into account the specific characteristics of this problem (the need of high precision, almost real time calculation, expensive objective functions that solve systems of PDEs, and etc). The presence of multiple optimal solutions with good match to the data will be detected and its impact in the forecast of production will be analyzed. Numerical results will be given for an exhaustive set of problems, that considers all possible parameter value cases.

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The Speaker • *Dr. Susana Gomez is a researcher at the Institute of Research in Applied Mathematics and Systems IIMAS, at the national University of Mexico UNAM. She has B.Sc. In Chemical Engineering at the Universidad Iberoamericana, Mexico City, and a Masters and a Ph.D. in Applied Mathematics from Imperial College of Science and Technology, University of London, England. Her main scientific interest is the developmentof new global optimization methods (sequential and parallel) as well as numerical methods to be used in industrial aplications. More specifically, she has been recently working on parameter identification inverse optimization problems, in particular in the modelization and characterization of water and oil reservoirs. She has also worked in simulation and optimization of chemical processes related problems. She has directed or participated in research projects with the Mexican Institute of Petroleum IMP, with the Mexican Petroleum Company PEMEX, with Polymer industry Industrias Resistol, with the French Institute of Petroleum and with the Mexican Institute of Water Technology IMTA. She has directed a research consortium called OPTIMA with the petroleum companies TOTAL (french) and AGIP (italian). She has published more than 50 papers, edited two scientific books and produced 11 industrial reports. She has more than 250 citations to her work.*