

ADVANCES IN THE MODELLING AND SIMULATION OF OIL DRILLING OPERATIONS

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ABSTRACT

The aim of this mini symposium is to bring together researchers in computational mechanics, computer science, engineering and applied mathematics, and practitioners in oil engineering, to tackle the problems of computer based oil drilling modelling & simulations.

The oil drilling industry faces great challenges as the traditional reservoirs become depleted and the companies explore deeper in the Earth crust, further offshore and in unconventional resources (shale). In these situations the drilling conditions are harsher on the tools and require not only a more efficient use of the engineering techniques but also newer technologies. Catastrophic failures of the material or the well itself could become prohibitive in terms of time and cost for the oil companies. Therefore, a smart and efficient use of the engineering and scientific knowledge of all the processes involved is even more critical.

The focus here is to identify the numerous challenges faced by the industry and the scientific tools that are readily available or in development to tackle these challenges. To name a few, we are interested in the following:

- Dynamics of long drill-strings and characterization of the excitations in bottom hole drilling operations.
- Drilling cuttings transportation, wellbore cleaning, settling of cuttings in the wellbore and process optimization.
- Hydraulic fracturing (Fracking) processes and their control to prevent contamination of water reservoirs and other valuable geological resources.
- Completion operations such as sandjet perforation and sealing.

This symposium will present advances in the field of numerical methods such as (but not limited to) the Finite Element Method (FEM), the Discrete Element Method (DEM), particle-based and mesh-less methods such as PFEM, SPH and the FPM, High Performance Computing (HPC), and model reduction methods.

This symposium is organized with the aim of welcoming and bringing together the researchers and the practitioners to share techniques and challenges in order to promote the advance of the state of the art.