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MODELING OF SUB-SEA SEDIMENTATION PROCESSES USING A STOCHASTIC MODEL OF GRAVITY CURRENTS

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A gravity current consists of the flow of one fluid within another due small differences in density between the fluids. This is a very complex phenomenon and extremely difficult to be studied in nature [1]. Experimental models are used successfully to explore only some aspects of this kind of currents where their use is limited to reproduce only some effects [2]. A better understanding and detailing is one of the goals of geologists. In this sense, numerical models can assist to go beyond the current knowledge providing us greater knowledge about the dynamics of this currents as example, see [3] and [4]. This does not just involve detailed mathematical models but also models that take into account the inherent uncertainties of the model parameters. In that sense, the Uncertainty Quantification (UQ) proposes a methodology to assist in this task both to to obtain new knowledge about the physics of problem as determine the validity of numerical simulations aiming at giving greater credibility to the results. The numerical modeling of sedimentary flows, taking into account uncertain input parameters, can offer new knowledge to help the geologist to understand the mechanisms of geological formations that give rise to reservoirs crucial in oil exploration. In this work, we present a stochastic analysis of a sedimentation model considering uncertain input parameters. The statistical moments are approximated by the sparse grid stochastic collocation method, [5] and [6] while the equation model are solved by a fully parallel Navier-Stokes solver namely Edge-CFD, [7] being all of analysis supported by an scientific work ow tool for high performance computer environment [8].

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