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BAYSESIAN ASSESSMENT OF PHENOMENOLOGICAL VISCOTIY RELATIONS FOR COMPUTATIONAL MODELS OF TURBIDITY CURRENTS

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Numerical models can help to push forward the knowledge about complex dynamic physical systems. The modern approach to doing that involves detailed mathematical models. Turbidity currents are a kind of particle-laden flows that represent a very complex natural phenomenon. In a simple way, they are turbulent driven flows generated between fluids with small density differences carrying particles. They also are one mechanism responsible for the deposition of sediments on the seabed. A detailed understanding of this phenomenon, including uncertainties, may offer new insight to help geologists to understand reservoir formation, a strategic knowledge in oil exploration. We present a finite element formulation applied to the numerical simulation of particle-laden flows in a Eulerian-Eulerian framework. When sediment concentrations are high enough, rheological empirical laws close the model, describing how sediment concentrations influence the mixture viscosity. The aim of this work is to investigate the effects on the flow dynamics of some these empirical laws. We use two configurations for numerical experiments. Both numerical experiments are inspired in laboratory tests. We show how turbulent structures and quantities of interest, such as sediment deposition, are affected by the different empirical rheological laws. Moreover, we employ a Bayesian framework to validate the employed hypothesis and introduce a stochastic error term for taking into account the modeling error.