Description of the research work proposed for a PhD

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Title: Modelling of sediment concentrations profiles in open channel flows

The context and objectives

The study of sediment transport in open channel flows is of direct interest for river environment, water quality, flood management and human intervention effect on natural channels.

The vertical distribution of suspended sediment concentration (SSC) plays a major role in the study of the transport rate and the transport capacities for a given channel and mastering the modifications due to the effect of suspended sediments on the vertical velocity profiles is a crucial issue for the transport studies.

The objectives of this thesis are to present the different ways to study and model the vertical distribution of suspended sediments concentrations profiles in open channel flows.

The recent results

In the last works, we studied the modeling of the vertical distribution of suspended sediments and velocity profiles in steady and uniform flows from different points of view.

We investigate the historical background of the vertical distribution of suspended sediments and velocity profiles study through a fine description of the evolution of the convection diffusion equation, the sediment diffusivity, the suspended sediments concentration profiles and the velocity profile in free sediment and in sediment laden flows under steady and uniform conditions.

As results we obtained a new model to calculate concentrations profiles of sediment distributions in the case of steady and uniform open channel flows.

These results are the subject of several publications:
