
VACANCY NOTICE

Two PhD Research Positions
in a four-year study of
FLOCCULATION OF COHESIVE SEDIMENTS

The Department of Hydrology and Hydraulic Engineering of the Vrije Universiteit Brussel (VUB) and the Hydraulics Laboratory of the Katholieke Universiteit Leuven (KULeuven) invite applications for two four-year PhD research positions to work on flocculation of cohesive sediments in the estuarine environment **starting in January 2008**. The successful candidates will participate in a research project, *“Coupling of a new in-situ measurement technique with a new modelling approach for the determination of the effective settling velocity of flocculating sediments in estuaries”*, funded by the FWO (Flemish Science Foundation) and work in a multidisciplinary team-working environment.

Research position 1: RP0811-1.1

Research efforts will be directed towards determining the relationship between flow and particle-turbulence interactions with emphasis on in-situ particle flocculation/deflocculation and transport mechanism as a function of hydrodynamic conditions and variability of both biotic and abiotic factors. The successful candidate will (1) apply and calibrate a newly developed in-situ real-time measurement suite of particle movement along with simultaneous measurement of turbulence and other hydrodynamic parameters; (2) use the calibrated measurement system, on meso-scale in the laboratory experiments and on macro-scale in the Scheldt estuary (Belgium), to investigate and determine the in-situ intrinsic properties of floc, including its size, shape, composition, density and settling velocity as well as particle-turbulence interaction; and (3) interpret experimental and field data for calibration and implementation of flocculation numerical model(s) which will be developed by the researcher described in the *“Research position 2: RP0811-1.2”*. Environmental biotic and abiotic parameters, such as microbial, geochemical compositions of suspensions, sediment fingerprints, will be analysed and provided by the laboratories of partners.

Candidates should have been trained in Engineering with knowledge of biogeochemistry and sedimentology and interest in computational fluid mechanics.

The successful candidate will be based in Brussels at the VUB. For further information and direct applications of the *“Research position 1: RP0811-1.1”*, please contact Dr. Margaret Chen (see *“Contact Information”* below).

Research position 2: RP0811-1.2

The second researcher will be in charge of the modelling work. The task of this researcher is to develop a new closure for the settling velocity parameter as occurring in 2D and 3D sediment transport models. The model will be based on concepts of kinetic flocculation theory, statistical properties of floc populations, and other. The new model will be compared with other available models and implemented in the KULeuven (finite elements) research

code FENST-2D, which can simulate processes in a vertical plane. This model solves the mass, momentum and turbulent energy conservation equations for the suspension together with the sediment balance equation in a fully coupled way, and can be modified at any point. The model will use the experimental data from the researcher described in the “*Research position 1: RP0811-1.1*” for the set-up, calibration and validation steps. The model will be used to simulate the lab experiments and the field conditions, as well as other data available in the literature. Implementation in other codes will be considered, depending on the progress.

This researcher will also be involved in the lab and field experiments, in particular the measurements of hydrodynamics and turbulence.

Candidates should hold a MSc degree in Engineering, preferably Civil, Mechanical or Chemical, with knowledge and interest in computational fluid mechanics (CFD).

The successful candidate will be based in Leuven at the KULeuven. For further information and direct applications of the “*Research position 2: RP0811-1.2*”, please contact Dr. Erik Toorman (see “*Contact Information*” below).

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