

Vacancy

Flanders Hydraulics is seeking the following
on a contractual basis

RESEARCHER ESTUARINE HYPER-TURBIDITY THROUGH TIPPING POINT BEHAVIOUR (BORGERHOUT)

FLANDERS HYDRAULICS RESEARCH
Berchemlei 115, 2140 Antwerp

vacancy number: 2014_5

CONTEXT OF THE POSITION

Flanders Hydraulics acts as a liaison between the port and waterway transport-related departments of the Flemish Ministry of Mobility and Public Works on the one hand and Belgian and foreign public services and private companies on the other. The underlying purpose is to make the knowledge and experience accumulated in the public sector available to third parties.

Flanders Hydraulics Research is a research centre that conducts general theoretical and experimental studies related to hydraulics and hydrodynamics as well as ship manoeuvrability (nautical sciences), for the purpose of designing ports, shipping lanes, artificial hydraulics projects, water management works, etc. The research centre also acts as an operational information centre that supports water management on the waterways (Hydrological Information Centre) and it has an operational and an information and training mission with respect to hydrologists and nautical experts (students, foreign experts, pilots, etc).

Such research is performed on the instructions of the department's administrative services as well as third parties, Belgian and foreign authorities and private institutions.

You will be working in a young and dynamic work environment where scientific integrity, flexibility and creativity are important values.

Within the Flemish-Dutch Scheldt Commission (VNSC), the Flemish and Dutch authorities have initiated the four-year research programme "Agenda for the Future" (Agenda voor de Toekomst – AvdT). The purpose of the program is to develop and use knowledge in order to improve management of the Scheldt and its coastal region. One of the research themes involves studying the risks of permanent and extremely high concentrations of suspended sediment (hyper-turbidity), as has been observed in estuaries such as the Eems, Loire and Yangtze. This situation is highly undesirable from both an economic and ecological perspective, as hyper-turbidity leads to low oxygen levels, and requires high dredging costs in order to maintain shipping lanes, amongst other things.

The occurrence of hyper-turbidity appears to be related to human activities, including land reclamation, sediment extraction and dredging. Moreover there are indications of 'tipping point' behaviour – if there is too much human intervention in an estuary, the system appears to drift slowly towards a condition of hyper-turbidity, which would be very difficult to rectify.

This means that when it comes to management of the Sea Scheldt (the Flemish part of the Scheldt estuary), knowledge of the potential occurrence of hyper-turbidity is of crucial importance.



JOB DESCRIPTION

You will conduct research that focuses on reproducing the transition to hyper-turbidity using a simplified mathematical description, also called an idealised model. This model is analysed using dynamic system theory methods (continuity, bifurcations) in order to identify the existence of tipping points. In addition, the physical mechanisms behind the existence of hyper-turbidity will also be identified. The results will be used to examine whether hyper-turbidity is at issue, and if so, what measures can be engaged in order to combat it.

You will apply the model in order to ascertain which generic measures can be taken in order to combat hyper-turbidity. You will also play a role in responding to various requests for recommendations addressed to Flanders Hydraulics Research, for which the model will be used. This includes EIA studies in the Sea Scheldt, whereby statements will have to be made in respect of the risks of hyper-turbidity with regard to, for example, policies on dredging and sediment disposal, as well as the enabling of navigability.

You will further communicate your findings to researchers involved in other AvdT projects. This project is also complementary to a Ph.D. research project that is set to launch at TU Delft, and so intensive interaction with the relevant research team in Delft is envisaged.

In order to gain experience using idealised models, the required mathematical techniques and the physical interpretation of the model results, you may spend a significant part of your time during the project at the Delft Institute of Applied Mathematics (DIAM).

You will report to the coordinator of the research group.

YOUR PROFILE

DIPLOMA AND WORK EXPERIENCE

- a master's degree in the exact sciences (any of the natural sciences or mathematics) or a master's degree in the applied sciences (such as engineering);
- a thorough knowledge of analytical and approximating methods for solving (partial) differential equations;
- a thorough knowledge of the physics of tides and sediment transport;
- knowledge of mathematical methods used in dynamic system theory is an advantage;
- a relevant Ph.D. is a recommendation but is not a prerequisite;
- knowledge of numerical modelling of hydrodynamics and/or shallow water equations is an advantage.



YOUR TECHNICAL COMPETENCES

- a thorough knowledge of and a strong affinity with mathematical techniques;
- a prime interest in providing substantiated explanations in terms of physical mechanisms;
- experience with programming in Matlab/Octave, C or Fortran, or a willingness to learn;
- a readiness to publish the results in peer-reviewed academic journals;
- the ability to write clear reports on your own work, both for external clients and for securing knowledge on an internal level. Reports at Flanders Hydraulics Research are written in Dutch or in English.

YOUR PERSONAL COMPETENCES

- **Continuous improvement**

You continuously improve your own performance as well as that of the entity by being prepared to learn and to grow together with changes.

- **Client-orientation**

You undertake actions in order to offer the client the most suitable solution in respect of questions and issues that are not as readily evident.

- **Cooperation**

You assist and consult with others.

- **Reliability**

You work on the basis of the codes of integrity, precision, objectivity, equal treatment, decorum and transparency, according to the basic rules and social and ethical norms (diversity, environmental care, etc). You fulfil agreements and assume responsibility.

- **Problem analysis (analytical thinking)**

You make connections and see causes.

- **Opinion forming (synthetic thinking)**

You formulate hypotheses and reach logical conclusions on the basis of the available data.

- **Initiative**

You take the initiative with regard to solving structural problems within your own field (reactively and structurally).

- **Verbal skills**

You ensure that clear two-way communication takes place.

- **Writing skills**

You structure what you want to state and adhere to a suitable use of language that depends on the situation or the readership.

- **Diligence**

Under increased pressure you continue to provide high-quality work.

WHAT WE OFFER

- The position is an appealing one due to the large variety of assignments and the high level of contact outside of the department.
- You are part of a dynamic organisation that is interested in innovation and that permanently endeavours to improve its services.
- There is a great deal of opportunity in respect of further education, courses and modern IT support.
- While your workload can be high, much effort is devoted to creating an optimal private life-work life combination, and we offer 35 days of leave per year and a system of working hours on a sliding scale. During school holidays professional childcare services are available for children between the ages of 3 and 14 at our head offices (Brussels, Antwerp, Ghent and Bruges).
- Public transport for commuting is free, as is hospitalisation insurance.
- You are recruited at the level of deputy director or engineer (rank A1) and receive the appropriate salary scale, according to whether you have a master's degree in exact sciences or one in applied sciences.
- Your gross monthly salary (adjusted to the current index), not including statutory allowances, is based on your diploma and your work experience (for further information, please see: <http://www.werkenvoorvlaanderen.be/salarissimulator>)
- The Flemish government intends to reflect, as much as is possible, the society for which it works. Candidates are consequently selected on the basis of their qualities and skills, irrespective of their gender, origin or any disabilities.
- The contract will be for one year, with the option to extend it until the end of the four-year AvdT project, subject to a favourable interim assessment. Permanent employment is an option, however this depends on possible upcoming opportunities that arise during the project.

INTERESTED?

For further information on the position, please contact:

George Schramkowski, researcher at Flanders Hydraulics Research
tel: 00 32 3 224 61 88
email: George.schramkowski@mow.vlaanderen.be

For further information on the application procedure and the employment conditions, please contact:
Lieve Van de Water, personnel manager, Flanders Hydraulics Research
tel: 03 224 61 66
email: lieve.vandewater@mow.vlaanderen.be

TO APPLY

To apply, please send your motivation letter and CV to IkWilWerkenBijHetWL@mow.vlaanderen.be before 8 May 2014.

Interviews are intended to take place on May 28 2014, but of course exceptions are possible