

# Experimental investigation selective withdrawal IJmuiden

## MSc Graduation project

### Introduction

At the moment the world's largest shipping lock is being constructed at IJmuiden, The Netherlands. The lock is situated between the North Sea and the Noordzeekanaal providing access to the Port of Amsterdam. The locking operations will increase the salt load on the adjacent canal which is to be mitigated by means of so-called selective withdrawal. This involves the construction of a vertical screen in the discharge canal releasing excess water from the Noordzeekanaal into the North Sea. The screen leaves a relatively small opening directly above the bed. This favors the extraction of water situated near the bed – which is generally saltier - thereby increasing the effective salt load of the discharge. The principle of selective withdrawal has been proven to work in a number of applications, but the specific situation at IJmuiden requires a further optimization of the salt screen. For this purpose a 3-dimensional numerical flow model is used. To validate the model a series of experiments is presently conducted at Deltares investigating the flow and salt transport through the screen at a 1:40 scale (figs. 1 & 2). This should give confidence in the performance of the computational model while it will also extend our knowledge on the exchange of salt at hydraulic structures. The latter will become increasingly important in the future as climatological changes progress.

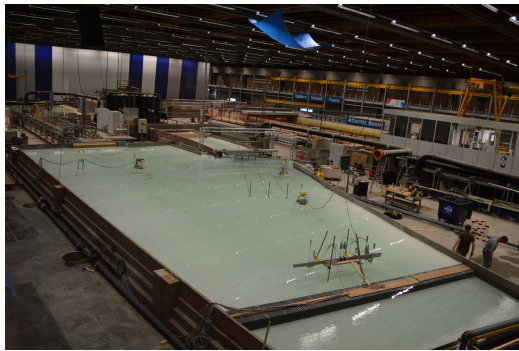
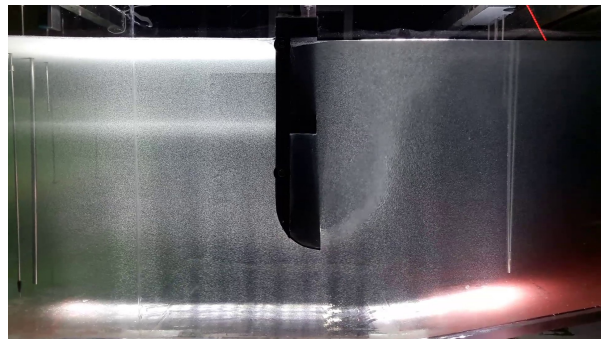


Figure 1. Experimental model of selective withdrawal at IJmuiden [Deltares]

Figure 2. Observed flow pattern at salt screen [Deltares]



### Scope

The experimental facilities at Deltares can be used to study additional scenarios and/or alternative lay-outs of the selective withdrawal. This involves the investigation of design alternatives, adjusting the experimental model, performing the measurements, and processing and analyzing the experimental data. The latter can be complemented – not necessarily - with simplified and/or more complicated numerical modeling.

### Planning

In view of the availability of the experimental facilities the project will preferably start October/November 2019. A large part of the work will be carried out at Deltares who will also provide a working place.

### Requirements

It is recommended to pass/study the courses on turbulence and density currents. The project can be part of the specializations Environmental Fluid Mechanics or Rivers, Ports, Waterways and Dredging Engineering.

### Committee

The graduation committee will consist of Wim Uijtewaai, Robert Jan Labeur, and various members representing Deltares and Rijkswaterstaat.

### Information

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