Abstract
Hidroboya [1] (or Hidro-Buoy) is a new platform for water monitoring that introduces a new concept: keeping sensors dry and away from water inside an internal chamber that is filled with fresh water when necessary. This paper describes a Simulator of the Hidroboya Sampling Platform. Hidroboya Sampling Platform can be compared to the systems used to perform blood analysis where some samples of blood are taken out of our veins and are moved to a place where they can be analyzed in the best conditions for the sensors that perform the analysis. Traditional methods do not sample water and only sample data. In doing this the sensors get fouled in a few weeks and the data they feed become erroneous. The Hidroboya Sampling Platform Simulator has been done to help researchers understand the actual behavior of water when going up to the measuring container and the air consumption when putting it back down in its sampling point.

Keywords - buoy, marine sensors, fouling, physical simulation, computer graphics.

I. INTRODUCTION
Here, we will remember slightly the general overview for Hidroboya [1]: buoy main part is a strong hosepipe hanging from a floating body. The hose contains several sampling catheters which are used to get water from different depths (as these tubes go out from the main hose and finish at the desired sampling depths). The main hose is securely bound to the anchoring chain in one or more points to avoid excessive hose movement. The sampled water will go through a “sampling chamber” located inside the floating body. Sensors inside the chamber will get the desired data. As we are keeping sensors away from sea water (or sweet water) most of the time we get a “fouling free” buoy.

II. HIDROBOYA SIMULATION
During Hidroboya development, we decided to create a graphic Hidroboya simulator that nowadays is a standalone software product. Simulator has been built in Java around a graphic interface developed using QT Jambi [2] (a Java version of the well-known QT graphic library for C++). In figure 1, we see a snapshot of the simulator showing a Hidroboya scheme over which we can interact to learn Hidroboya working or in order to get other purposes. As the simulator allows defining all the working parameters of a buoy: number and length of catheters, electro-valves and compressor parameters, peristaltic bomb... our simulator can be used to design buoys for practical installations. Although the graphic engine is the central part of the simulator (and it was the first part to be implemented), code is well structured into three main modules. These modules are the following: graphic engine (responsible for representing the buoy and interacting with user), physical simulator (responsible to compute water movements according to fluid physics) and communications with the control board (in this case it is not the user who interacts with compressor and electro-valves but an automatic control board).

We want to emphasize the fact that water ascent into the catheters is simulated using the Hagen–Poiseuille equation (catheter is full of pressurized air which suddenly drops to normal pressure), which in this case yields a differential equation: where x(t) is the water level. Afterwards we simulate the working of a peristaltic bomb used to continue the chamber filling when the chamber is located over the level of the water, what was the situation in the primarily versions of the Hidroboya.

III. CONCLUSIONS
In this paper we describe the development of a Hidroboya simulator as a parallel product, designed to help in Hidroboya workings. Simulator began by being a small auxiliary application by due to its adaptability has become a major utility that can contribute greatly in all Hidroboya processes. Simulator development and growing has undergone the same processes and milestones of Hidroboya development.

REFERENCES

Figure 1. Left: sensor arrangement in a classical buoy (above), sensors become fouled, right: Hidroboya (above), clean sensors (below).
Figure 2: Graphic representation of the simulation.