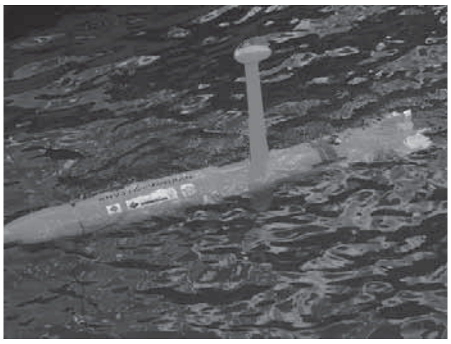

Figure 2. AHV3-Cormoran test at sea

All the electronic is powered using a 5 Volts 15 Watt maximum DC/DC converter. The actual two NiCad battery packs installed in the vehicle give energy of 10A hour at 12V DC. This means that the vehicle has about 2 hours navigation autonomy, 15 hours immersion and measuring autonomy, or a combination of them.

In the software point of view, a driver has been developed to access all the capacities inside the ISA double port memory, a test program (to test all the capacities separately), and the main control software that can access a GSM/GPRS modem connected directly to the PC-104 in order to control the platform remotely and send the data obtained. It has been developed for a 2.4 kernel of Linux O.S. and capable for 2.6 using Posix standard.

Security algorithms have been developed in all the boards and PC main control algorithm. Piston and pressure security is implemented inside the Motion Board using pulse control timing to avoid maximum motor piston pressure (when reached the piston motor is pushed at full speed to expulse all the water inside it in order to emerge to surface).

Finally, the data obtained from the platform is sent as fast as possible in order to add operational oceanography capacities. GSM/GPRS and radio link technologies is been used because of their viability in coastal environments avoiding expensive satellite communication systems.

3. Conclusion

Experimental tests (Figure 2) have been conducted with the platform described using control program connected to radio link modem and GSM/GPRS modem with positive results. Future tests will be done in order to improve control algorithms and to prove the platform in all kind of environments.

Doing by the fact that the electronic design has been done modular, new improved mechanical designs can be developed with few changes in the electronic part. Because of the extension capacities added like second CAN bus, double port memory separated blocks, and analog sensing, future sensors and boards can be inserted easily in order to improve the platform.

4. References

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OBTAINING TURNING CIRCLES OF AN AUTONOMOUS HIGH SPEED CRAFT MODEL WITH A WEB-WI-FI PLATFORM

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Key Words: - In-scale manoeuvering, DataSocket, web server, laboratory marine remote (lmr).

1. Introduction

This paper describes the undertaking of several tests and manoeuvres, using a marine vehicle experimentation platform, to verify the stability and steerability of these vehicles with autonomous in-scale physical models. The model (Figure 1) has an Industrial PC which communicates by means of a wireless network with the laptop on land, which can be connected to another or other PCs through Internet using 3G UMTS technology.

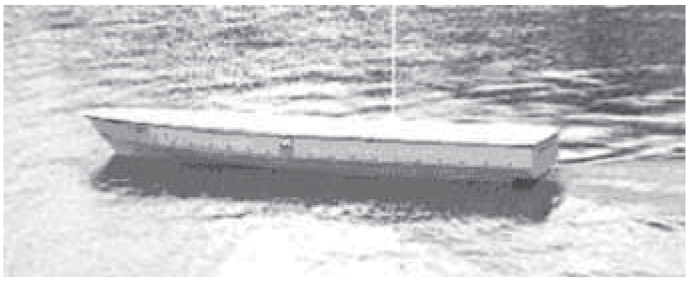

Figure 1. High speed craft model.

The elements that make up the remote experimentation environment of marine vehicles are (Figure 2):

Elements on board:
• Propulsion and steering elements: 4 engines, 2 servomotors, 2 speed variators, 4 turbojets, 2 stabiliser flaps and a T-foil.
• Control circuitry: (PWM= Pulse Width Modulation), receiver station.
• Instrumentation: Electronic gyrocompass, GPS, UMI (inertial measurement unit) and 2 accelerometers (One at stern and the other at bow).
• Industrial PC with Windows XP and an access point for the wireless communications.
• DAQ devices.

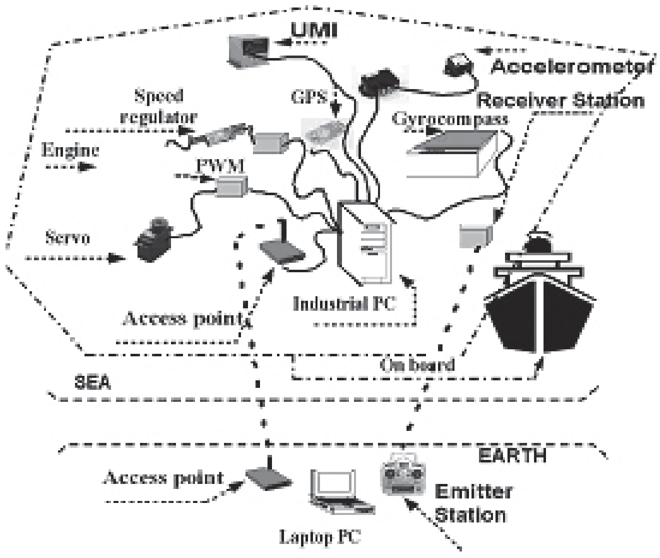

Figure 2. Elements that make up the platform

Elements on land:
• Industrial PC with Windows XP, access point and emitter station.

A software support has been implemented in the Industrial PC, which is capable of acquiring and storing data from all of the instruments from the test platform from a distance. It is possible from a distance, via the web and via DataSocket, to view data and modify the parameters of all of the instruments of the platform using the wireless network with Wi-Fi technology and also internet network with 3G UMTS technology. A software support developed in LabVIEW is used for this. The software admits different protocols of communications with the platform and is suitable for carrying out the Guidance, Navigation and Control of the physical model.

This software makes it possible to perform the sea trials most widely used to determine the main characteristics of the steering and manoeuvring of a sea vessel, such as: turning circle, zig-zag manoeuvre, pull-out manoeuvre and spiral manoeuvre. The tests with the autonomous in-scale high speed craft model were carried out in the surroundings of the Bay of Santander.

2. Results of the Sea Trials with the Platform

Figure 3 shows the turnig circle towards starboard. In the abscissa axis, the number of samples captured with a sampling period of 100 milliseconds are represented. In the ordinates axis, the data on the heading measured with the electronic gyrocompass are shown as well as the rotation angle of the turbojets. In the case of the evolution towards port, a turbojet angle of 30º has been set. This figure shows a first phase of approximation, typical of the manoeuvre, in which the heading of the physical model remains constant with a turbojet angle of 0º. Then, the turbojet angle is modified to 30º, which is when the physical model begins to rotate towards port, and this turbojet angle is maintained until the model passes 360º twice to perform the full manoeuvre.

Figure 4 shows the turning circle towards starboard curve, following the same philosophy as for the port manoeuvre. For this curve, a turbojet rotation of -30º has been set.

In the development of these trials, a constant position of 0º degrees has been set for the bow flaps and 7,5º for the stern T-foil. The meteorological conditions were the most suitable possible, with a calm sea and gentle winds.

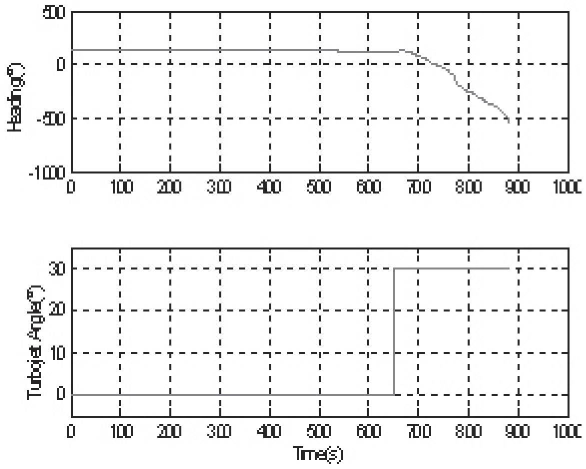

Figure 3. Turning circle towards port curve

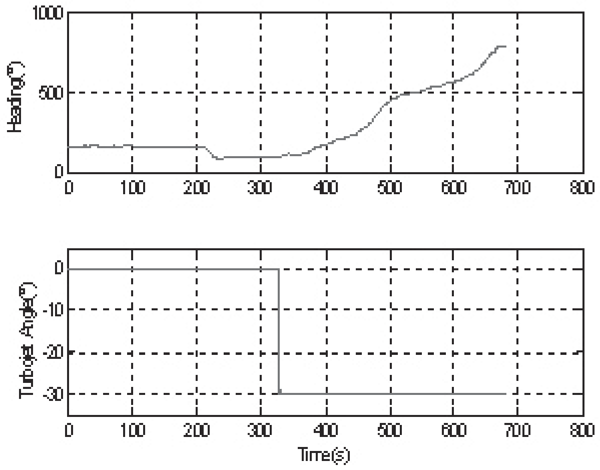

Figure 4. Turning circle towards starboard curve

3. Conclusions

A test platform for marine vehicles has been used to obtain the turning circle curves of a physical model.

This platform is equipped with the actuators and instrumentation necessary for carrying out the data-gathering and control of the platform in such a way that an optimum following of the trajectories can be performed. A software system has been designed for this platform which is equipped with a wireless network for communicating the vehicle with the laptop on land and there is also the possibility of accessing this network through Internet. The application designed deals with the gathering of data and the control of the physical model.