SYMBIOSIS NUMERICAL – HYDRAULIC MODELS

Agustí Sánchez-Arcilla

- Meteo-oceanography Catalan coast
- Sources of uncertainty
- Port models
- Nesting in predictive models
- Field (campaigns) measurements
- Calibration and validation

Figure 1 Permanent Pier research station (waves, currents, SSC, temp)

DIGITAL COMMUNICATIONS APPLIED TO UNDERWATER ACOUSTICS

Pierre-Jean Bouvet

Unlike the development of wireless networks over radio channels, advancement of wireless underwater communication systems has occurred at a much slower pace. However, in the last decades, there has been a tremendous increase in research and development of underwater acoustic (UWA) communication systems due on the one hand to the progress in digital communication research and on the other hand to the rapidly growing needs for wireless underwater transmission applications.

In this course, we first detail the several approaches to transmit data in the underwater medium and explain why the acoustic vector is well adapted for this medium thus widely used in the current commercial modems.

In a second part, we remind some tools of signal processing and introduce basics in digital communications that will be used in the following parts.

In a third part, we describe the underwater acoustic channel by listing all the effects that will occur when a sound is transmitted undersea.

In a fourth part, we explain the main modulation strategies used in UWA communication and different tradeoff in terms of spectral efficiency, robustness and complexity. Then we focus on a communication system based on linear frequency modulation (LFM) providing low data rate but high robustness in the underwater environment.

In the practice part, we propose to build a MATLAB© simulation system modeling an end-to-end UWA transmission chain. In a second step, the students will have to decode an audio file acquired in an experimental water tank containing an unknown digital message .