

DIRECTIONAL TYPIFICATION OF THE SEA STORMS ON THE CATALAN COAST

Waves are a key element in most of the operational sea field applications, specially into coastal engineering, the design, planning and maintenance of the offshore industry, navigation routes and sea safety.

It seems necessary to synthetize the data in order to be more comprehensive, but keeping, at the same time, all the information. The wave spectrum is one of the most usual ways to describe the rang of frequencies and directions properties: distribution of wave energy across frequency is represented by one-dimensional energy spectral density function $S(w)$, whereas in the directional domain it's represented by the directional spreading function $D(w, \theta)$.

The directional wave spectrum is the most convenient technique but not the most used one, because of its complexity. Only basic data such as significant wave height and peak period are commonly consulted, but the rest of the information required by the directional wave spectrum is ignored or not known because of the sophisticated analyzing process. Selection of data sensors and the analysis method could be decisive on the final results. That's why is more and more necessary to study it in depth. The present work focuses on the direction of wave spectrum analysis method, taking the data from sea storms recorded by the buoys in Cap Tortosa and Delta del Llobregat, following an specific procedure:

- Comparative study of different directional wave spectrum analysis software for a sea storm study (Diwasp and Wafo), selection of the more suitable one, and detailed analysis of the different configuration parameters and calculation method.
- Selection of directional ranges from sea wave's main directions on the Catalan coast.
- Development of an auxiliary program (ApWafo), based on the application of Wafo tools. It separates from global sea wave, the specific results responding to main directions, in order to obtain the evolution (for all the sea states) of each of the different parameters.
- Analysis and evaluation of the results obtained from any kind of sea wave (general and directional): in-depth study of sea storms where some parameters seem out of range, identification of relations between parameters, typical ranges of values, etc.

From the study made from the available data of Cap Tortosa, it has been identified some well-defined trends of one kind of directional sea wave, especially "mestral", which is the most complex one to analyse and predict due to the short fetch. The shortage of sea storms at the Delta del Llobregat has made that the results can only be considered as approach to some trends that must be updated when new data become available.

As a prior step to the directional wave analysis, some previous no-directional studies have been updated (Roté, A.; 2004) in basis of additional data from sea storm occurred from 2nd quarter of 2003 to 2006, stressing the wave climate spectrum study.

Mentors: Xavier Gironella and Jesús Gómez

Author: Gemma Mas i Lluch