TITLE: Extremal characterization of waves in Catalan coast
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ABSTRACT

This dissertation studies the extremal characterization of waves in Catalan coast. It does an extremal wave analysis described as a wave height associated with every return period. The wave height is, undoubtedly, the most important factor that affects in coastal structures, because it's the responsible for the worst damages caused in them. For this reason the significant wave height has to be the most important and decisive parameter in the design and the calculation of the coastal structures.

To be able to characterize the extremal wave is needed first wave dates of the zone that is tried to study. This dissertation concentrates on three zones of Catalan coast: the first one placed to the north of Catalonia, corresponds to the zone of Roses's gulf, the second one, it is the zone of Tordera's Delta in Blanes and the third one situated to the half of Catalan coast, corresponds to the zone of Llobregat's Delta. In each of these zone a scalar buoy exists that belongs to the net XIOM. The buoys provide instrumental dates of great quality and that can be used for an extremal analysis.

For the extreme analysis it is necessary to select the extreme events or storms. To select the buoys's dates there are two methods: the method of the total sample or method of the initial distribution and the method of peak values that includes another two methods: the method of the annuals maximums and the method POT (*Peak Over Threshold*). The latter is used in the dissertation and also it is the most used actually in any study about this question.

The statistics models of extreme wave are based on the distribution functions, about which have developed many studies. There are extreme distributions that theoretically are those who better can describe extreme events (maximums and minimums). The wave's maximums normally are adjusted to three distributions families: the one that corresponds to Gumbel's function, to that of Frechet's function and to that of Weibull's function.

To adjust a distribution to dates is necessary a adjustment method that estimate distribution's parameters in order that it adjusts as best as possible to the dates. The adjustment is realized with three methods: the method of sampled moments, the method of de maximum verisimilitude and the method of the square minimums, which is not any more than a sophistication of the graphical method in which the linear simple regression is used.

All the combinations of distributions functions with the different adjustments methods are going to give different results of wave height and periods, some of which will not be acceptable. But there will be many that they will be acceptable and have to be decided which it is the one that is considered to be more adapted to represent to this dates. To take this decision the test of Kolmogorov-Smirnov goodness of adjustment is used.

With the distribution function and the adjustment method most adapted for every group of dates already the wave heights can be know for the different return periods that we consider to be more suitable and also the return periods can be know for different wave heights. The results have to go accompanied by a reliable interval because an important uncertainty exists in each of the adopted steps and the fact of giving a detailed estimate is not correctly.

In the dissertation appear practical cases in which a coastal structure is tried to design on the Catalan coast with some characteristic. With the recommendation of the ROM 0.2-90 it is necessary to determinate the useful life of structure and the maximum admissible risk. Combining different values of useful life and risks are obtained the different cases. In each of them the return period is calculated from these two parameters and with the distribution function and the adjustment corresponding to every zone, is decided the wave height and the reliable interval associated with this period of return.