

CORRELOGRAMS FOR PACIFIC OCEAN WAVES

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1. Introduction

This paper presents some examples of correlograms for surface waves on the ocean. Our interest in this subject parallels that of Seiwell at Woods Hole [1]. Possible uses and limitations of correlograms in the statistical treatment of wave data are suggested in the final section. The ideas may, of course, be pertinent for other processes with similar spectral character.

2. Computer facilities

Some means for rapid computation is a practical prerequisite to any extensive work with correlograms from empirical data. Even very modest amounts of data lead to prohibitive labor if only a desk calculator is used. At the Marine Physical Laboratory we have developed electronic analog computers for obtaining correlograms and also for obtaining the statistical distribution for instantaneous values of any signal [2].

Signals are furnished to the correlator through a simple resistance-capacity high pass filter whose limit corresponds to a period equal to the longest correlation interval which is to be used. Hence the correlograms obtained are comparatively free of the effect of slow fluctuation, or trend, in the data. The longest retained periods are usually not over 5 to 10 percent of the total sample length.

3. Nature of data

The wave records from which correlograms have been taken were made available through the courtesy of wave research groups, at either Scripps Institution of Oceanography or the University of California at Berkeley. Three recording stations are represented, at La Jolla and Oceanside on the southern California coast, and at Guam. In all cases the datum furnished is fluctuation of pressure near the ocean bottom at a depth ranging from 40 feet to 140 feet. The depth fixes a short period limit for the recorded waves, of 6 to 10 seconds. On the other hand a long period limit of the order of 20 seconds also usually exists, either for natural or instrumental reasons. Thus the total spectral range involved is generally not over two octaves.

The material collected is merely that which was first available. While it presumably typifies fairly common conditions, it does not pretend to any systematic inclusion of varied sea surface states.

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