

## SOME RESULTS OF SPECTRAL ANALYSIS OF WIND WAVES IN SOUTH ADRIATIC

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### Summary:

For characteristic synoptical situation in the Adriatic with the wind from SW-SE, consecutive wind wave records were analysed. Spectral analysis was done for six time series, and obtained power spectra were compared and discussed with respect to the wind speed, wind duration and the fetch.

### Résumé

On a analysé les ondes causées par le vent, correspondant à la situation synoptical caractéristique dans l'Adriatique, avec le vent de direction Sud-Ouest Sud-Est. On a fait l'analyse spectrale pour les six enregistrements et on a comparé et discuté, par suite, les spectres obtenus, par rapport à la vitesse du vent, sa durée et le "fetch".

Wind wave characteristics in the Adriatic sea are not very well known due primarily to the lack of data. A few years ago the wave - recorder KELVIN-HUGHES MS 26 F/A was installed in the South Adriatic (Smirčić, 1976) what gave us possibility to obtain some preliminary results on the characteristics of wind waves in that region.

Two main wind systems in the Adriatic sea could be important for the generation of high energy wind waves. Those are northerly and southerly winds. Northerly winds are very likely less important as they have relatively short fetch.

In this paper results of spectral analysis (BLACHMAN and TUKEY method) of 6 consecutive wind wave records for a synoptical situation with the wind from south are presented. For this kind of synoptical situation we could expect maximal wind wave energy as the fetch is the largest.

On Fig.1 hourly values of wind data are shown. As it could be seen strong wind from south with speed over  $10 \text{ ms}^{-1}$  persisted for more than 27 hours. For first 22 hours wind was relatively steady from SE and then December 28<sup>th</sup> 1970 at 5 a.m. wind changed direction into S and persisted for five hours with speed over  $25 \text{ ms}^{-1}$ .

During this interval of time 6 ten minute records were obtained. Spectral analysis was done on these records and also significant periods and heights were calculated.

On Fig.2 obtained power spectra are shown and continuous increase of wave energy with wind duration could be seen (power spectra at 1 p.m., 7 p.m. Dec. 27<sup>th</sup> 1970 and at 0840 a.m. Dec. 28<sup>th</sup> 1970). Power spectrum for the record of

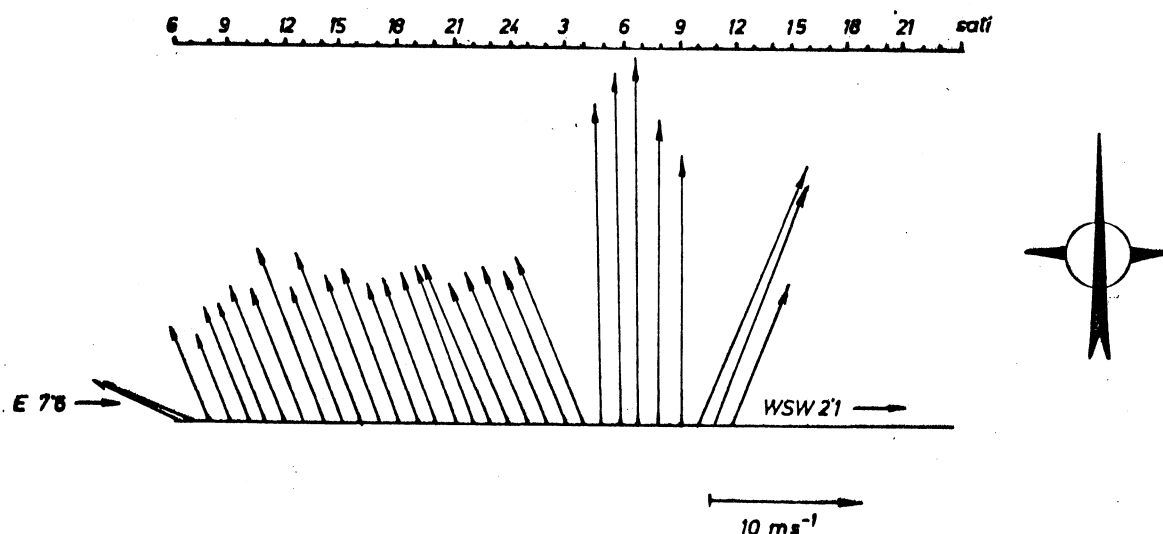


Fig. 1 – Time series of hourly wind data

0840 a.m. Dec. 28 th 1970 shows the influence of extremely strong wind from south which started to blow after a longer interval of SE wind. This influence is evident from a strong energy increase with respect to the previous record. Maximum of wave energy appears on the period of 7.2 secs. From Fig. 2 strong decrease in wave energy is evident after the wind changed direction to WSW at 1 p.m. in Dec. 28 th 1970. Period of maximum of spectral density function was also calculated by empirical relation for fully developed sea (Defant, 1961). Obtained values are always higher than values found by inspection of spectral density functions. Difference is the largest for the record at 0840 a.m. in Dec. 28 th 1970. This can be explained by the fact that fetch is too short and also wind duration is not enough long to produce fully developed sea.

From these results some characteristics of wind waves in South Adriatic could be given but they need to be proven by further investigations as only one synoptical situation was analysed.

The analysis show that:

- With energy increase maximum of spectral density function moves toward longer periods or lower frequencies.
- During the chosen situation state of fully developed sea has not been reached because of the short wind duration and, for those wind speeds, short fetch.

This should be valid for almost all the situations in the Adriatic taking into account dimensions of the sea and characteristic wind durations.

#### REFERENCES:

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2. SMIRČIĆ, A., 1976.: Contribution to the knowledge of wind waves in South Adriatic, M.S. THESIS, UNIVERSITY OF ZAGREB.

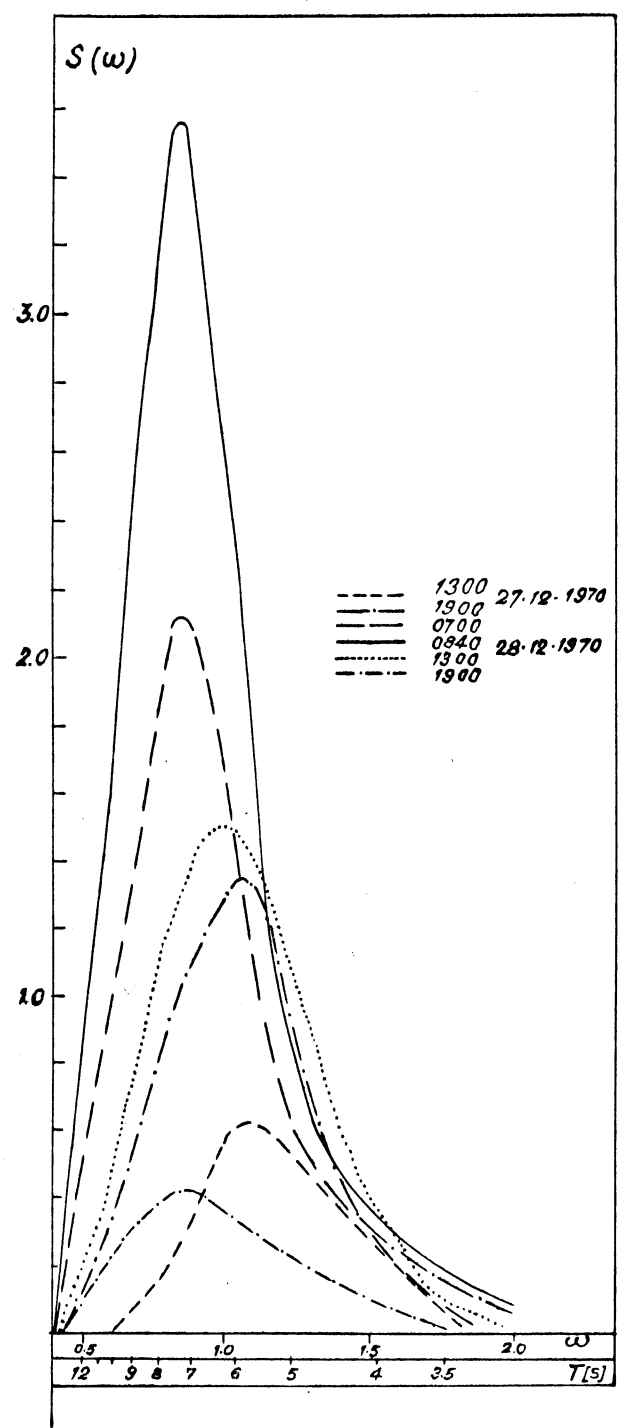


Fig. 2 - Power spectra of consecutive wind wave records for the chosen synoptical situation

