Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09335, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09335
EGU General Assembly 2008

Empirical transfer function for the relation between pressure fluctuations beneath the sea surface and surface elevations

V. Melnikov (1), **V. Sokolov** (2)

1. P.P.Shirshov Institute of Oceanology RF Academy of Sciences, Moscow, Russian Federation (vmelnikov@ocean.ru:)
2. State Oceanographic Institute, Moscow, Russian Federation (vasokolov@ inbox.ru)

Due to the lasting demand for the statistical descriptions of surface waves for many practical purposes and some ambiguities encountered in several papers, we revisited the old method for evaluating sea surface displacements from subsurface pressure records.

A simple instrument system consisted of two pressure gauges (GMU-2) combined with the direct surface elevation (electric) meter have been deployed from the Shirshov Institute of oceanology pier in the Blue Bay on the eastern coast of Black Sea. Resolutions were 0.001% for pressure and 3 cm for wave heights. Total depth in the place was 7 m. Simultaneous measurements had been performed in the course of the 10 days in each autumn of last two years, during 10 minutes in each hour, with sampling frequency 4 Hz. Sea state conditions varied in the range 2-6 of Beaufort scale number.

Using time series of two pressures at two different depths and surface elevations, we calculated all possible cross- and auto- spectra and transfer functions. Mean for each sea state condition empirical transfer functions relating pressure and wave height spectra have been compared with the same for several wave model signal-noise time series.

As was shown earlier by Zaslavskii M.M. and Krasitskii V.P in the frames of surface waves linear theory, simple algebraic relation (widely used in applications) between

subsurface pressure fluctuations and surface displacements is valid for monochromatic waves, only. For the random wave field, they deduced correct spectral transfer function which relates one-sided pressure and elevation spectra. Our spectral data showed good agreement with this approach, except for the cases of wave field inhomogenity, e.g, in the presence of far-field swell.