



## Investigation of the foam influence on the wind-wave interaction within laboratory modeling of atmosphere-ocean boundary layer

Maksim Vdovin, Yuliya Troitskaya, and Daniil Sergeev

IAP RAS, Nonlinear geophysical processes, Nizhny Novgorod, Russian Federation (arfirius@yandex.ru)

Foam producing on the wave crests due to the wave breaking under severe wind conditions playing important role in the transfer processes in the ocean-atmosphere boundary layer.

The effects of foam influence on the momentum transfer processes and the parameters of the surface roughness were studied within the laboratory simulation. Experiments of wind-wave interaction were carried out on the Thermostratified Wind-Wave Tank (TSWiWaT) IAP (description see in [1]), in a wide range of the air flow conditions up to hurricane winds (equivalent wind speed  $U_{10}$  from 12 to 38 m/s). Specially designed continuous foam generator was used to cover water surface. The parameters of air flow and waves were measured by scanning Pitot gauge and system wire wave gauges respectively for six different wind speeds for clean water and for the case of foam presence. Drag (momentum transfer) coefficient was calculated by the method basing on self-similar behavior of the wind velocity profile in the channel. FDM method (see [1]) was used to obtain 3D spectra (frequency, wave number, direction).

It was shown that the foam reduces the amplitudes and slopes of the waves in comparison with the clean water in the whole range of wind speeds investigated, and the peak frequency and wave numbers remain almost constant in a contrast with clear water.

The drag coefficient dependence demonstrated similar behavior, i.e. increased slower with increasing of the wind in comparison with clean water.

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1. Troitskaya Yu. I. , D.A. Sergeev, A.A. Kandaurov, G.A Baidakov, M.A. Vdovin, V.I. Kazakov Laboratory and theoretical modeling of air-sea momentum transfer under severe wind conditions // J. Geop. Res, V. 117, C00J21, 13 PP., 2012.