



Wind Stress Variation over the horizontally variable Roughness of Ocean Surface: Theory and Experiment

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We consider the effect of localized variations of the sea surface wave roughness on the near- surface turbulent wind. These variations can be caused by oil, surfactants, inhomogeneous currents, internal waves, etc. The corresponding transition effects in the turbulent wind over the sea is a very difficult problem, if only due to uncertainties in the turbulent closure models for the non-stationary and inhomogeneous flows. Here we suggest some practical schemes for calculating wind variation near the surface, the average short-wave roughness of which is varying in space and time. They include a generalized two-layer model, three-layer model, and a direct approach based on the solution of the Reynolds-type equations for the air flow velocity and turbulent kinetic energy. Laboratory experiments in a wind-wave tank are also described and compared with the theory.