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Integrated model for a wave boundary layer

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A new semi phenomenological model is constructed, allowing to estimate friction velocity u_* via 2D wave-spectrum S and mean wind W at the standard horizon. The model is based on the momentum-flux balance equation averaged over a wave-zone covering a space from troughs to crests of waves. In the model there are only two constituents of the full momentum flux: the wave part, τ_w, corresponding to an energy transfer to waves, and the tangential part, τ_t, do not related to the energy transfer. The wave part is sheared into to contributions: one of them, supported by energy containing waves, is expressed via wind W, whiles the second one, supported by short waves, is expressed via u_*. The tangential part is parameterized by means of similarity methods under assumption that it corresponds to an effective viscosity momentum-flux realized in the wave-zone between through and crests. The model is verified on the basis of simultaneous measurements of 2D-spectrum S, wind W, and friction velocity u_*, described in Babanin&Makin (JGR,2008). Results of verification show that a relative error for the magnitude of $(u_*)^2$ is of the order of 25%, which is fairly good, taking into account the experimental errors.