A new method to calculate Fresnel reflection coefficient of wavy sea surface

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In studying light and image transfer in seawater the influence of Fresnel surface reflection is as significant as scattering and absorption phenomena. In these cases a knowledge of the reflective properties of sea surface at different wind speeds is very important. At present, little is published about these properties. We present here results of numerical modeling of angular reflection coefficient of sea water as a function of two directional angles, zenith angle of illumination, and wind speed.

The ray-tracing computer model was developed and implemented as a FORTRAN code to generate wave slopes and elevations. In order to generate a realistic sea surface the model used the Pierson-Moskowitz and Paul Hwang wave height spectrums. The values of Fresnel reflection coefficient were averaged over sea surface areas and time to produce resulting angular distributions of reflection and transmission coefficients. The applicability of computed dependencies to radiative transfer modeling in sea water is discussed.