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Light scattering properties of sand particles suspended in seawater

Vladimir I. Haltrin,† and Eugeny B. Shybanov °

† Naval Research Laboratory, Ocean Optics Section, Code 7333
Stennis Space Center, MS 39529, USA
phone: 228-688-4528, fax: 228-688-4189, e-mail: <haltrin@nrlssc.navy.mil>

° Marine Hydrophysical Institute, Ukrainian Academy of Sciences
2 Kapitanskaya St., Sevastopol, 335000, Crimea, Ukraine

Current models of seawater optical properties usually do not explicitly include sand (or quartz) particles. These models are good for open ocean waters and biologically stable coastal waters but fail to adequately predict optical properties of coastal waters with shallow sandy bottom. In this presentation fill this gap by extending our previous optical model of quartz suspensions in seawater to sand particles with size parameter 20,000 and higher.

In our model we consider sand as an non-absorbing scattering matter. Mie scattering calculations for quartz particles with the size parameters ranging from 48 to 20,000 were performed and published earlier. Here we extend the upper limit of sand particles size parameter from 20,000 to 100,000. To accomplish this task a special Mie scattering program was written. This program is capable to compute Mie scattering coefficients on particles with size parameters up to one billion and higher.

By analyzing computed material we obtained analytical relationships that connect an efficiency factor and a backscattering probability with the size parameter for any monodisperse sand particle size distribution. These regression relationships were used to create an extremely fast algorithm to compute spectral light scattering and backscattering coefficients for any polydisperse system of sand particles.

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