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METHOD FOR FAST MEASUREMENTS OF UNDERWATER ANGULAR RADIANCE DISTRIBUTION OVER ALL DIRECTIONS OF THE WHOLE SOLID ANGLE*

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Investigations of light transfer in the sea are mainly made by means of underwater photometers, supplied by light collectors for measurements of various types of irradiance. In new applications of hydrooptical investigations such as shipborne sea truth measurements for coastal zone, accuracy requirements of irradiance meters are so high that the problems concerned with shape precision cosine, spherical, or hemispherical light collectors become significant. Developing appropriate correction methods, accounting for deviations in light collector characteristics and immersion effect influence are also important issues. In addition, for in situ sea truth measurements of coastal waters, careful measurements of light field structure will also be required, which cannot be ensured with routine underwater irradiance meters. It is necessary to create new measurement methods of the light field parameters, which can give not only the depth dependence of spectral irradiance attenuation, but also the precise angular structure of light fields over full vertical profile. Such data can be obtained by detailed measurements of the angular distribution of underwater irradiance, which is the most common characteristic of the light distribution in sea water. It is proposed to perform radiance measurements in different directions with an optical scanner. A general scanning system for study of underwater radiance distribution is discussed and an analysis of the equations describing the laws of scanning is performed. It is shown that the practical realization of a variant of the scanning assembly provides an opportunity to develop simple, reliable and highly informative meters. A prototype of an instrument which is capable of scanning over zenith and azimuth angles has been constructed and has undergone preliminary testing. The field tests show that it can be adapted for scanning over large-range angles as an underwater photometer.

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