

81) Proceedings of SPIE - The International Society for Optical Engineering

Volume 11176, 2019, Номер статьи 111762R

Photonics Applications in Astronomy, Communications, Industry, and High-Energy Physics Experiments 2019; Wilga; Poland; 26 May 2019 до 2 June 2019; Код 154662

Multispectral environmental monitoring of phytoplankton pigment parameters in aquatic environments(Conference Paper)

Kvaterniuk, S.a, Kvaterniuk, O.b, Petruk, V.a, Mandebura, A.a, Mandebura, S.a, Gradz, Z.M.c, Rakhmetullina, S.d, Arshidinova, M.e

aVinnytsia National Technical Univ., 95 Khmelnytske Shose, Vinnytsia, 21021, Ukraine

bVinnytsia Humanitarian Pedagogical College, 13 Nagirna Street, Vinnytsia, Ukraine

cLublin University of Technology, Lublin, Poland

Просмотр дополнительных организаций

Краткое описание Просмотр приставочных ссылок (33)

Mathematical modeling of the spectral characteristics of the coefficient of diffuse reflection of a layer of an aqueous medium with phytoplankton particles with a change in the pigment parameters is carried out. The functions of the probability density of errors occurring in the measuring channel of the multispectral environmental control are investigated. The dependence of the errors of the first and second kind and the reliability of the control of the pigment parameters of the phytoplankton on the threshold value of the diffuse reflection coefficient for a separate spectral channel of the monitoring instrument are analyzed. In particular, when using four channels with wavelengths of 530 nm, 590 nm, 620 nm and 730 nm in the multispectral environmental monitoring tool, the value of the reliability of the control of the ratio between chlorophyll a and total chlorophyll 0.939 is obtained, and when three channels with wavelengths of 450 nm are used, 470 nm and 660 nm, the reliability of the control of the ratio between carotenoids and total chlorophyll 0.972 was obtained. The working wavelengths and the number of channels of the multispectral environmental control are determined by the spectral characteristics of the phytoplankton pigments (chlorophylls and carotenoids), as well as the spectral characteristics of the radiation source and the photomatrix of the monitoring instrument. © 2019 SPIE.