Filina A. A. (Taganrog, Russia), **Nikitina A. V.** (Taganrog, Russia), **Lyashchenko T. V.** (Taganrog, Russia), **Kravchenko L. V.** (Zernograd, Russia) — **Mathematical modeling of microbiological destruction of oil pollution in coastal system based on the stochastic approach.**

Research of petroleum hydrocarbons biodegradation processes in the coastal system was performed using the stochastic approach. The probabilistic models take into account the simultaneous influence of external factors on the mass transfer rate. The model of microbiological destruction process of oil pollution has the form:

$$(P_i)'_t + div(\mathbf{u}P_i) = \mu\Delta P_i + \varphi_i, i \in \overline{1,4}; \varphi_1 = f_1 - \alpha P_1 P_2 / \{q(P_1 + k_1)\} - \varepsilon_1 P_1,$$

$$\varphi_2 = \alpha_2\{\beta\psi - \delta\}P_2, \varphi_3 = \{\delta - \beta\psi\}P_2 + D(\overline{P_3} - P_3) + f_2, \varphi_4 = k_4 P_2 - \varepsilon_4 P_4,$$

where P_i are concentrations of i-th component, $i \in \overline{1,4}$, the index i indicates the type of substance: 1 is the petrolium hydrocarbons, 2 is the phytoplankton, 3 is the nutrient (nitrogen and phosphorus), 4 is the metabolite; φ_i is a chemical-biological source; $\beta = (\beta_0 + \gamma P_4)$ is the growth dependence of P_2 due to the P_4; α_0 the growth rate of P_2 in the absence of P_4; γ is the impact parameter; $\delta = \delta(C)$ is the phytoplankton loss ratio due to the extinction (specific mortality) taking into account the influence of salinity C; D is the specific pollutant rate; f_1, f_2 are functions of oil and pollution source; $\overline{P_3}$ is the maximum possible concentration of pollutants; k_4 is the excretion coefficient; $\varepsilon_1, \varepsilon_4$ are decomposition coefficients of oil and metabolite; $\psi(I, T, C, P_1, P_3)$ is the function, taking into account the influence of light, temperature. salinity, oil concentration P_1, nutrient concentration P_3 on the growph P_2; $\mathbf{u} = (u, v, w)$ is the motion vector of water flow; μ is the diffusion coefficient. We add the corresponding initial and boundary conditions.

The adequacy of the proposed probabilistic observations' models was checked on the basis of an algorithm in which takes into account the variances values of the number of actual parameter values and its component caused by the influence of randomness elements.

REFERENCES

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