Korotkova A. S. (Rostov-on-Don, Russia), **Chistyakov A. E.**(Rostov-on-Don, Russia), **Nikitina A. V.** (Taganrog, Russia) **Investigation of the oil spill in the Azov-Black Sea basin based on the stochastic approach.**

The mathematical model of the transport of oil and petroleum products in the Azov-Black Sea basin, taking into account their microbiological destruction, is a system of nonlinear partial differential equations with reactive terms [1]. After linerization and discretization based on schemes of an increased order of accuracy, each equation of the system, the right part of which contains the functions of medium fluctuations, can be reduced to a diffusion–convection–reaction type equation, has the following form:

$$\left(s_i^{n+1} - s_i^n\right)/\tau + uCs_i^{n+\sigma} = \mu Ds_i^{n+\sigma} + f_i^{n+\sigma},$$

$$Cs_i^{n+\sigma} = \left(-s_{i+2}^{n+\sigma} + 8s_{i+1}^{n+\sigma} - 8s_{i-1}^{n+\sigma} + s_{i-2}^{n+\sigma}\right)/\left(12h\right),$$

$$Ds_i^{n+\sigma} = \left(-s_{i+2}^{n+\sigma} + 16s_{i+1}^{n+\sigma} - 30s_i^{n+\sigma} + 16s_{i-1}^{n+\sigma} - s_{i-2}^{n+\sigma}\right)/\left(12h^2\right),$$

where $Cs_i^{n+\sigma}$– is the convective transfer, $Ds_i^{n+\sigma}$–is the diffusion operator, s_i^{n+1} –the value of i-th calculation function on the new time layer; s_i^n – the value of the calculated function on the current layer; $i = \overline{2,(N-2)}$; u – the speed of the water flow; μ – diffusion coefficient; h,τ – steps through space and time; σ –circuit weight.

Theorem. For the stability of the difference scheme for the diffusion equation—convection—reaction, the following time step constraints must be met: $\tau < 3h^2/(8\mu)$, and the grid Peclet number: $Pe^2 < 4/(75\alpha)$, $\alpha = \mu\tau/(6h^2)$.

To verify the adequacy of the proposed probabilistic observation models, an algorithm has been developed that allows analyzing the convergence of full scale (measured) and calculated (based on the developed mathematical model) data based on the randomness criterion, which takes into account the variances of a number of actual parameter values and its random component caused by the effects of random elements.

СПИСОК ЛИТЕРАТУРЫ

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