A METHOD FOR INDERECT DETERMINATION OF THE DIFFUSIVITIES BY SOLVING AN INVERSE PROBLEM FOR ADVECTION/DIFFUSION EQUATIONS

O. V. Nagornov[a], **E. S. Sokolov**[a], and **V. Tchijov**[b]

[a]Moscow Engineering Physics Institute (State University)
Kashirskoe shosse 31, Moscow 115409, Russia
nagornov@dpt39.mephi.ru

[b]Facultad de Estudios Superiores Cuautitlán UNAM
Av. 1 de Mayo, s/n, Cuautitlán Izcalli
Edo. México, C.P. 54740, México
tchijov@servidor.unam.mx

A method for indirect determination of the diffusivities K_x, K_y, K_z by solving an inverse problem for the 3D system of advection/diffusion equations for air pollutants is proposed. The method is applied to the systems with constant-value diffusivities as well as to those with $K_z = K_z(z)$. To find the solution of the inverse problem it is necessary to know the concentrations of air pollutants as functions of time at several space points. The comparison of these concentration profiles against the solutions of the forward problems allows for finding the diffusivities. The forward problems are determined by the iterative procedure. This procedure connects the diffusivities of the new iteration with the diffusivity coefficients at the previous iteration so that the discrepancy functional decreases with the number of iteration. The discrepancy functional characterizes a deviation between measured and calculated concentration profiles. The stochastic approximation method is applied to minimize the discrepancy functional. It provides the convergence of the iteration process in a wide range of the diffusivities. The method of reconstruction of the diffusion coefficients is applied to experimental data for the Mexico City region [1].

References

[1] O. V. Nagornov, E. S. Sokolov, V. E. Tchijov, "Indirect Determiantion of the Turbulent Diffusion Coefficients," *Journal of Engineering Physics and Thermophysics*, v. 76, p. 417-423, 2003.