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ABSTRACTS BOOK

Venue: TOBB University of Economics and Technology
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LIST OF ABSTRACTS

Numerical Modeling of the Discharged Heat Water Effect on the Aquatic Environment from Thermal Power Plant

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Abstract

The paper presents a mathematical model of the thermal load on the aquatic environment. It is solved by the Navier-Stokes and temperature equations for an incompressible fluid in a stratified medium based on the splitting method by physical parameters which approximated by the finite volume method. The numerical solution of the equation system is divided into four stages. At the first step it is assumed that the momentum transfer carried out only by convection and diffusion. At the second stage, the pressure field is solved by found the intermediate velocity field. The third step is assumed that the transfer is carried out only by pressure gradient. The fourth step of the temperature equation is also solved as motion equations. In reservoir - coolers spatial temperature change is small (it usually does not exceed 20 ^{0} C). Corresponding change in the density is much smaller than the magnitude of the water density. Therefore, stratified flow in the reservoir - cooler can be described by the equations in the Boussinesq approximation, i.e. in the motion equations a variable of water density can be replaced by some constant everywhere except the members representing the Archimedean force. In view of the above, the starting point for describing the flow in the laminar regime is the Navier - Stokes and temperature equations [1, 2, 3] stratification development is taken into account, which is added to the right hand side of motion equation. The obtained numerical results of three-dimensional stratified turbulent flow were revealed qualitatively and quantitatively approximately the basic laws of hydrothermal processes occurring in the reservoir-cooler.

Keywords: Stratified medium, Navier-Stokes equation, operational capacities, thermal power plant, finite volume method, Runge-Kutta method, thermal discharge.

References

[1] A. Issakhov, Mathematical modelling of the influence of thermal power plant on the aquatic environment with different meteorological condition by using parallel technologies, Power, Control and Optimization, Lecture Notes in Electrical Engineering, 239 (2013), 165–179.

[2] A. Issakhov, Mathematical modelling of the influence of thermal power plant to the aquatic environment by using parallel technologies, AIP Conf. Proc. 1499 (2012), 15–18.

[3] M. Fossati, P. Santoro, S. Urrestarazu and I. Piedra-Cueva, Numerical study of the effect of a power plant cooling water discharge in the Montevideo Bay, Journal of Applied Mathematics, 2011, Article ID 970467, 23 pp.