

**3<sup>rd</sup> International Conference on  
Applied Mathematics & Approximation Theory  
May 28-31, 2015 – Ankara – Turkey**

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**AMAT 2015**

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**ABSTRACTS BOOK**

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**Venue: TOBB University of Economics and Technology  
Söğütözü Street No: 43, 06560 Ankara - Turkey**

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

Alibek Issakhov

*al-Farabi Kazakh National University, Almaty, Kazakhstan,  
alibek.issakhov@gmail.com*

## 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. 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  $20^{\circ}\text{C}$ ). 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 Archimedeon 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 algorithm is parallelized on high-performance computer. 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

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