

STUDY ON EFFECT OF THE WATER TEMPERATURE ON DISTRIBUTION OF SUSPENDED SEDIMENT IN RESERVOIRS AND LAKES USING FLOW3D

Redvan Ghasemlounia^{1,*} - M.Sedat Kابداسلی²

¹ Ph.D. Candidate at Istanbul Technical University, Division of Hydraulic and Water Resources

² Professor at Istanbul Technical University, Civil Engineering Faculty

ABSTRACT

Water is the most basic requirement of human, which covers 71 percent of surface of the world, approximately. From this amount of water on the earth, only fresh water is usable for human. Thus, it is important to save the fresh water resources. In this way, numeric modeling has the basic role in the management and saving of water resources. But it is very difficult to modeling the real flows, which are be in the nature. The complexity of real fluid flow makes it impossible to solve the governing equations without making some form of simplifying approximation, even with the use of complex models and fast computers. In this study, the effect of water temperature on concentration of suspended sediment is investigated by changing the inflow water temperature and concentration. For this purpose, the FLOW3D computational fluid dynamics code was selected. Finally, results are shown and compared with each other in figures and tables.

Keywords: Reservoir, Stratified Reservoirs and Lakes, FLOW 3D, Suspended Sediment

1. INTRODUCTION

Nowadays, aridness is the main problem for the arid an semi-arid regions. On this basis, the preservation of the water resources has high attention and particular importance. The importance of dam construction in these regions has increased in recent years. Therefore, in these regions, dams are important manmade structures, because they are the only source of water during water shortage seasons. In arid and semi-arid countries, dams are mostly constructed for supplying the drinking water and irrigation. Here, management of these resources plays a major role than the construction of them. So, water resources need a good management in the present century because of these limitations of water resources, especially. For better management of water resources, investigation of all parameters of the hydrologic cycle and climatic characteristics including precipitation, wind, temperature, runoff, evaporation and etc. is required. These natural and climatic characteristics affect the water resources and dam reservoirs water quality. There are several factors and phenomena affect the quality of water in lakes and reservoirs. One of the most important problems that occur in dam reservoirs is sedimentation. Sedimentation is the main phenomena that lead to increasing the dam death storage. This phenomenon is endangering the life of dams insensible and during the time, gradually. There are several factors and phenomena affect the quality of water in lakes and reservoirs. One of the most important problems that occur in dam reservoirs and lakes is sedimentation.

One of the other phenomenon that affect water quality in reservoirs is named as stratification. Study of stratification phenomena has special significance because of the importance of water quality. Stratification in lakes and dam reservoirs has two forms as: thermal stratification and the stratification that caused by concentration of suspended sediment. Which sometimes known as density stratification. Each of these phenomena could effect on the water quality of reservoirs or lakes, extremely. So, study on these phenomena is one of the important things that should be done in water resources management, especially in reservoirs and lakes. The thermal stratification of lakes and reservoirs refers to a change in the temperature at different depths, and is due to the change in water's density with temperature. In reservoirs or lakes, this kind of stratification is separated into three layers. First layer is a well-mixed zone of reservoir or lake and is named as Epilimnion. Other word, Epilimnion is the upper layer of reservoir or lake. In summer, temperature of water decreases from the surface to the bottom in thermally stratified reservoirs and