

## **Abstract:**

Nowadays, consuming of water has enhanced due to increasing population and raising the demand of water for agriculture and industry. Besides of this, exploitation from groundwater resources has greatly increased for drinking and agriculture, deficit conditions in reservoir and critical drawdown have seen in aquifers. Furthermore, preservation and sustainable development of groundwater resources requires a comprehensive knowledge and understanding of aquifer and aquifer's response subjected to stresses and possible changes. Today, this work is done by numerical modeling, because the costs are lower from other ways. The model of MODFLOW (finite difference) designed and published by the United States of America Geological Survey (USGS) in 1988. In this study, the Torbatjam-Fariman plain at the Ghareghum basin in Razavi Khorasan province is simulated by the MODFLOW model within PMWIN software. The conditions groundwater of this plain is critical and forbidden for exploitation. A conceptual model of aquifer underlying originally developed. The main aquifer withdrawals from wells in the plain are agriculture and drinking. Checking the water tables in well observations in the 2000s shows an average of 1.54 meters drop in annual. And the average water tables of aquifer get from 941.42 meters in 2000-2001 water years to 926.07 after 10 years. Beside of this, the maximum drawdown has occurred in the area of Ahmad Abad, the observation well of No. 26. The calibration of model was done in 8 stress period from October of 2001 to September of 2003, and the validation of model was done with 4 stress period and with the latest data of water resources. Based on the calibration results the maximum, minimum and average of hydraulic conductivity coefficient are respectively 45, 12 and 24.7 meter per day, and the specific yield are respectively 16, 1.1 and 6.32 percent. Finally, in order to model predictions, the scenarios were used to reduce the discharge from wells show that the by the water withdrawn from the wells must be reduced throughout the plain particularly around the cities of Torbatjam and Fariman. The best solution for reducing discharges is getting familiar the farmers with modern agriculture and implements the pressurized irrigation systems in the region. According to, the majority of farmers are yeoman farmers, it require to support by government for integration of bit agricultural lands that it need to the regular programming for the best doing it.

**Key Word:** Simulation, Groundwater flow, MODFLOW, Torbatjam - Fariman plain, PMWIN.



University of Zabol  
Graduate school  
Faculty of Water and Soil  
Department of Water Engineering

**The Thesis Submitted for the Degree of M.Sc in the field  
of Irrigation & Drainage**

**Groundwater Flow Simulation of  
Torbatjam-Fariman Plain using  
MODFLOW**

**Supervisor:**

Dr. M.R. Mollaeinia

**Advisor:**

Dr. M. Tabatabaee

M.Sc. A.L. Bagherian

**By:**

M. Farkhari

February 2012