Determination of Hydrodynamic Parameters of Tbilisi Geothermal Deposits

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World Energy crisis and continued rise in prices for fuel makes search for renewable cheap and environmentally clean energy resources as well as its rational use a most important priority. As one of such promising resources is the Earth thermal heat (Geothermal Energy). On the Earth surface geothermal heat can be observed in the form of thermal waters. This resource is practically unexhaustive, easy for exploitation and effective both from economic and environmental points of view. Moreover hydrothermal reservoirs have vide spectrum of applications in: industry, agriculture, house heating and spa purposes, in perfumery and sanitation service and market purposes.

At the moment there are known about 250 separate natural thermal springs and artificial wells as well as spring clusters with water temperature of 30□-108□C. Their total debit is about 160000 cubic meters per day, but this is not a limit. It is established that the observed thermal water reserves in Georgia are about 350-400 cubic meters per year. According to 1993 data the stock of total geothermal waters was nearly 90000 cubic meters per day that equals 500000 tons of conditional fuel or 500 cubic meters of gas annually. Nowadays these reserves look unrealistic because present conditions of exploitation lead to decrease of well pressure and debits; moreover, in some cases the full termination of gravity flow was observed. At the moment at the majority of thermal water deposits in Georgia the situation is worsened and essentially differ from the mentioned above.

By the amount of observed resources, their degree of thermal potential and exploitation perspectives thermal water deposits in Tbilisi is very promising; thus assessment of their conditions should be regarded as the most important task.

It is obvious that digital modelling of basin is one of the main parts of proposed research which finally is aimed to complex geologic, hydrogeologic and geophysical investigation of Tbilisi hydrothermal area, and evaluation of its hydrodynamics, parameters and water resources as well as assessment of steady development scenarios. The digital model represents a cornerstone of project, which enables evaluation of different scenarios of development and exploitation of geothermal deposit.

Digital modelling will be carried out based on widely accepted approach (see e.g. Domenico and Schwartz, 1998; Middlemis, 2000) using Feflow software and consisted of following steps: construction of the geological structure containing aquifer and study of its lithological composition.

- determination of the depth and thickness of groundwater deposit; establishment of flow directions;
- evaluation of the amount of heat flow;
- Determination of hydrodynamic parameters (hydraulic conductivity, transmissivity and storativity etc.);
- Establishment of boundary conditions of investigated region and creation of conceptual model; realization of numerical model.
- Working out of recommendations for environmentally reasonable regime of exploitation.