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HYDROGEOLOGICAL INVESTIGATION OF AQUIFERS

STRUCTURE OF APPLICATION

INTRODUCTION

1. HYDROGEOLOGICAL METHODS OF AQUIFER INVESTIGATION

- Direct investigation
  - Mapping: outcrops, geomorphology of area, elevation of piezometric level in wells/boreholes
  - Boreholes: lithology, grain, porozity(n), permebility (Kp), thickness (M/h) etc.
  - Hydrogeological parameters determined by hydrodynamic tests in hydrogeological boreholes groups:
    - Parameters of the aquifer: piezometric level (NP), hydraulic conductivity (K), hydraulic difuzivity / coeficient of piezoconductivity (a) etc.
    - The hydraulic parameters of pumping wells: dynamic level (DL), rate flow(Q), drawdown (s), radius of influence (R), local piezometric drawdown (Δs)/ hydraulic resistance (ζ)
- Indirect investigation (geophysical) and hydrogeological parameters evaluated (synthesis of bibliographical documents)
  - Seismic methods: geological structure, petrophysical characteristics
  - Gravimetric methods
  - Magnetic methods
  - Geoelectric methods
    - Vertical Electrical Sounding (VES)
    - Borehole geophysical logging
  - Ground-penetrating radar (GPR)

2. HYDROGEOLOGICAL PARAMETERS DATABASE

- types of database in software package **ROCKWORKS (BOREHOLEMANAGER, UTILTIES**)
- stages of the boreholemanager database
- ways to transfer between the two types of database (boreholemanagaer/utilities)
- analysis of the data application (attached excel file)
- graphical representation of data application
  - point map of boreholes
  - lithological columns of boreholes and humidity variation for minimum 4 boreholes
  - lithological columns of all boreholes in 3D
  - 3D lithological model of the hydrostructure

3. STRUCTURAL MODEL OF THE HYDROSTRUCTURE

- surface topographic map (calculated from elevation of boreholes)
- establishment of hydro-structural units:
  - vadose zone: soil and some gravel (up to the hydrostatic level)
  - aquifer (accumulated in the gravel and sandstone)
  - impermeable bed of the aquifer represented by clay
- hydrostructural model 3D based on data from the excel file attached
- one vertical section (fence type)
- two plan maps on different elevation

4. PARAMETRICAL MODEL OF THE HYDROSTRUCTURE

- Distribution of hydrogeological parameters exemplified on a 3D model of moisture distribution determined in the boreholes from database
  - 3D unitary model
  - vertical section fence type and two plan map at two different elevations

5. HYDRODYNAMIC MODEL OF HYDROSTRUCTURE

- hydrodynamic map interpolated based on piezometric level in boreholes, overlapped on
  - 3D model of hydrostructure
  - spatial distribution of the boreholes

CONCLUSIONS

REFERENCES

Daniel Scrădeanu, Alexandru Gheorghe, 2007, Hidrogeologie generală , Editura Universităţii Bucureşti
Castany, G., 1967, Traité pratique des eaux souterraines, Deuxieme Edition Dunod, Paris.
Fetter, C.W., 1980, Applied Hydrogeolgy, Merrill, Columbus, Ohio.
Gheorghe Alexandru, 1978, Processing and synthesis of hydrogeological data, Abacus Press,, Bucharest.
Groundwater Geophysics-a tool for Hydrogeology,2006, Editor Reinhard Kirsch, Springer Berlin Heidelberg New York

NOTE

1. The homework will include a summary of the direct and indirect methods of hydrogeological investigation of hydrostructures completed with a **simplified conceptual model** of the hydrostructure underlying quantitative modelling of groundwater dynamics and consisting in three components:
   - spatial model (hydro-strctural)
   - parametrical model for umidity
   - hydrodinamic model

2. The homework will be presented in pdf format with the homeworks text, realised according with proposed structure.

3. All figures will have associated the topographic map TOPO.jpg ,
   with the coordinates of the corners: Xmin=0, Xmax=100,Ymin=0, Ymax=100

4. To achieve the homework use the package ROCKWORKS, and the excel file (HWi, i= 1,2, ...) and TOPO.jpg

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