

The opinion of the opponent of the master thesis

Work title: Analysis of boundary conditions of ground heat exchangers

Author of the work: Bc. Skarleta Floreková

Opponent of works: doc. Ing. Petr Horák, Ph.D.

Work description:

Master thesis "Analysis of boundary conditions of ground heat exchangers", is primarily focused on analysis of boundary conditions and major factors affecting a reliable design and heat transfer of horizontal ground heat exchanger in the area of geothermal activities at Spa Island in Piešťany. Assessments of its possible environmental impacts such as an origin of subsoil thermal alterations due to the heat extraction including a soil freezing around the pipelines and potentially contamination of groundwater are discussed too. As a part of this final thesis, three numerical analyses were processed using finite element method software COMSOL Multiphysics 5.6., which may occur in this specific area.

Work evaluation:

	Great	Very good	Good	Unsatisfactory
1. Professional level of work	☒	☐	☐	☐
2. Suitability of used methods and procedures	☒	☐	☐	☐
3. Use of professional literature and work with it	☒	☐	☐	☐
4. Formal, graphic and linguistic arrangement of the work	☒	☐	☐	☐
5. Fulfillment of the assignment	☒	☐	☐	☐

Comments and questions about the work:

1. Describe the basic characteristics of the Comsol software used in the master thesis.
2. Why was the computational soil model divided into two layers (solid layer and porous medium), page 38?
3. What boundary conditions were used in the calculation on the surface of the exchanger pipe?
4. Describe the problem of the boundary condition of variable temperature in the calculation of the second variant.
5. Which of the three evaluated variants is closest to the actual behavior of the ground heat exchanger?

Conclusion:

The assignment of the master thesis was fulfilled in all points of the assignment. The quality of workmanship is excellent, graphic and formal design is very good. The difficulty of the topic is more difficult due to the application of numerical modeling. The student proved in the work that she is familiar with the given issues of heating, and is able to solve practical tasks in the field. I **recommend** the thesis **for defense**.

Classification level according to ECTS: **A / 1**

Date: January 24, 2021 Opponent's signature:.....