Monitoring of a pilot project as a basis for the dimensioning of energy sheet pile walls

Aim of the research project

The thermal properties and the prevailing temperature regime of open waters have a large renewable energy potential. In contrast to the ground the energy potential of open waters currently remains almost unexploited. Energy sheet pile walls produced by the company SPS Energy GmbH offer the opportunity for the future exploitation of energy stored in open waters. They consist of conventional sheet pile profiles equipped with special heat extraction pipes. Because of the sealing effect, a broad application area opens for the implementation of energy sheet pile walls for heat extraction. Depending on the area of application, energy sheet pile walls allow the exploitation of energy stored at shallow depths and particularly in open waters. Within the scope of an ongoing research project, characteristic values for the heat extraction rate of energy sheet pile walls will be determined and a suitable numerical tool for the dimensioning of energy sheet pile walls will be developed.

Approach

For the determination of representative heat extraction rates and for the evaluation as well as the optimization of the operating geothermal system energy sheet pile walls should be applied and operated in a pilot project. By an included technical monitoring internal and external influencing parameters will be determined in the pilot project. In additional large scale laboratory tests theoretical and practical investigations on the heat transfer between water, soil and sheet pile wall will be carried out. For this purpose a test station for heat extraction tests under different boundary conditions has been constructed. As a result decisive influencing parameters on the heat transfer and the entire geothermal system can be identified. Based on an existing calculation approach for the numerical simulation of plane energy geostructures a new approach for energy sheet pile walls will be developed and implemented into the software SHEMAT-Suite. This approach can be used for the future dimensioning of energy sheet pile walls.

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