

Thermal classification of soils

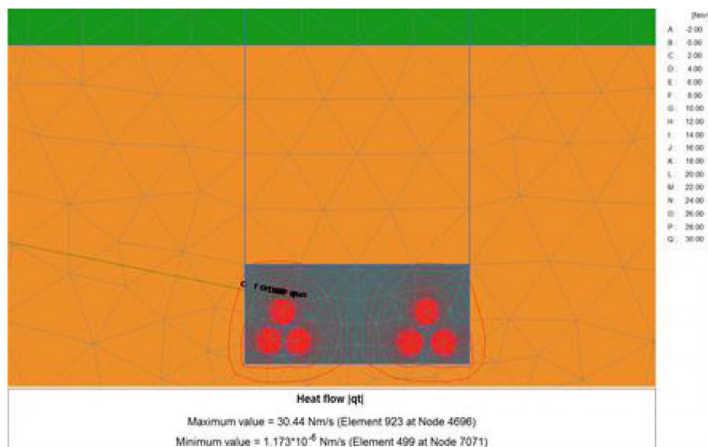
Buildings and Industrial installations

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FRANCE
Client
RTE

Project owner
RTE



Description of the project

Taking the thermal properties of soils into account in projects for geothermal heat exchangers, burial of electrical cables, or roadways and hydrocarbon pipelines subjected to freeze/thaw cycles, is a major issue.

TERRASOL, in partnership with BRGM (French Geological Survey) and the University of Paris VI, has conducted a study for RTE (French Transmission System Operator) aiming to develop a practical method for determination of the thermal conductivity of soils, based on the "GTR" classification from the French Road Earthworks Guide (French standard NF P11-300).

Description of the mission

This method takes account of the saturation state of the soil using the determination of the particle-size distribution curves of the various categories starting from the single points defined in the GTR. In a second step, the relationship between the particle-size distribution and the characteristic water content of the soils is defined by a simple empirical model.

Finally, the thermal conductivity is estimated according to various models in the literature. The predictions obtained by these different thermal conductivity determination methods have been compared successfully with several data sets covering all soil categories. This tool has been used in combination with the Thermo-Hydro-Mechanical module recently introduced in PLAXIS 2D to study heat flows around some reference structures (an example is shown here, around a high-voltage cable burial trench).

Key features

- Exploratory study for the determination of the thermal conductivity of soils