

GEOTECHNICAL ENGINEERING LECTURE 2014

Wednesday 12th November at 18:30 hours

Institution of Civil Engineers, One Great George Street,
Westminster, London SW1P 3AA

Thermal Response Testing: Challenges and New Applications

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Summary:

Thermal conductivity of the ground is an important parameter in the design of ground energy systems, which have an increasing role to play in providing renewable heat to the built environment.

For larger schemes, the bulk thermal conductivity of the ground surrounding the system is often determined in situ using a thermal response test conducted on a borehole heat exchanger. There is also an increasing trend to apply the test to energy piles. Although the test method is commonly used, its limitations are often not fully understood, leading to an over-simplistic interpretation that may fail to identify key facets of the ground and heat exchanger thermal behaviour. Some of these limitations will be magnified when applied to larger diameter energy piles.

This presentation will explore some of the uncertainties and limitations of thermal response testing with reference to two case studies. First an instrumented thermal response test carried out in a 150m deep borehole in east London will be examined. This test shows how a single unique value of bulk thermal conductivity may not be appropriate in all cases due to ground stratification and the presence of groundwater flow. Secondly the potential pitfalls of applying thermal response testing to energy piles will be explored using data from an instrumented test site in Texas. Here the effect of pile size and construction materials on the required test time will be discussed.

The presentation will then conclude with some practical recommendations about application of the thermal response test to both boreholes and piles and how it may fit within the site investigation process.

Biography:

Dr Fleur Loveridge is a Royal Academy of Engineering Research Fellow and a Lecturer in Geomechanics at the University of Southampton. She works on the thermal behaviour of ground heat exchangers and the soils and rocks surrounding them, with a particular interest in energy piles and other thermo-active geotechnical structures.

Prior to her return to academia Fleur spent nine years working as a consultant in geotechnical engineering, mainly at Mott MacDonald and before then Babbie Group. Her work included investigation, design and construction supervision for a variety of infrastructure schemes and applied research and development projects. Fleur is a Chartered Engineer and a Chartered Geologist. She was a contributing author to the Ground Source Heat Pump Association Thermal Pile Standard.



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