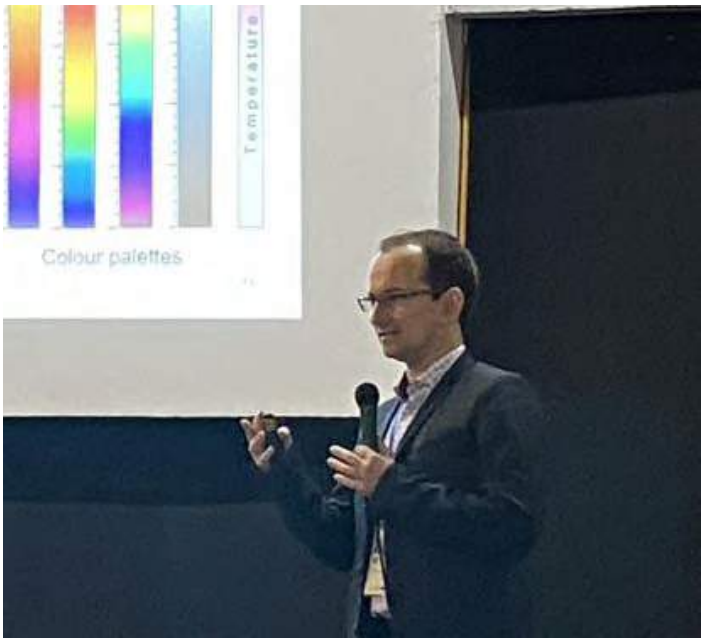
5. Infrared thermal imaging – principles and applications for civil engineering inspection

by Robert Olbrycht (Lodz University of Technology , Poland)



Infrared thermal imaging is a technique for acquiring images in the infrared spectral range. It is well-established in many branches of the industry and science. Civil engineering inspection is one of the fields, where thermal imaging cameras are commonly used. Inspection of buildings' thermal insulation is one of the common applications in this domain. Another one is visualisation of subsurface features thanks to the solar loading or heat excitation coming from another source. Thermal images can bring valuable information about the inspected objects, however, one needs to interpret this information correctly. This chapter is an introduction to physical principles of infrared thermal imaging. One of the most important factors for thermal imaging is emissivity, which affects not only the amount of emitted but also reflected radiation, assuming that the surface is not transparent. There are examples presented in this chapter, showing potential applications of infrared thermal imaging in inspection of modern and historic interiors and exteriors, with comments on interpretation of the results.

6. Assessment of Design Characteristics of UBH Sites from Engineering Perspective

by Kerim Aydiner (Karadeniz Technical University, Turkey)

UBH openings constructed in rock can generally be accepted as designed without any sound engineering concept. However, some openings have been standing for centuries. After a preliminary evaluation it can be said that these openings were constructed not ignoring some basic principles used in the design of underground openings. Although the selection of the opening dimensions and cross sections has not been done with a very professional approach, it is compatible with the basic opening design principles. This study examines the engineering design features of well-known UBH openings formed in the rock. In addition to dimensional properties of openings material properties of rock environment and the location and orientation of the openings are analyzed. Potential threats for these threats are also discussed for the future. Conditions that could create a threat to these sites in the future are also evaluated.