GEOMETRY MAPPING SYSTEM USING SOUND

U.S. Army Corps of Engineers

Acentech

CONSULTING SERVICES

- Applied acoustics research
- Analysis algorithms development
- Field deployment testing
- Hardware prototype development

PROJECT DESCRIPTION

This research project attempts to extend a technique — originally developed for medical use to determine the geometry of lung and nasal passages — to larger systems such as caves, tunnels, and piping systems. The technique involves injecting infrasound (low frequency sound) into the cave or tunnel and measuring the incident and reflected sound waves using two spaced microphones placed just inside the entrance. Computer algorithms, developed as part of this project, unravel the sound signals and produce a map of the cross sectional area that lies beyond the entrance. A field prototype, consisting of a loudspeaker capable of producing infrasound, the two microphone array, and the signal processing was field tested in an underground tunnel system that is part of a military urban training facility. This portable acoustics system will allow military personnel to determine the shape and extent of a cave or tunnel without having to enter it.

Potential commercial applications of this mapping technique include tunnels and piping networks in cities, where this acoustical system could be used to determine the extent of forgotten tunnel systems or possible constrictions due to tunnel failures or other obstructions.

O:\marketing\project summaries\research - govt\Geometry Mapping System.pmd