

**ACOUSTICS2008/874**  
**Predicting the acoustics of historic Istanbul Tunnel: Simulation,  
calculation methods and geometrical details**

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Istanbul Tunnel, which was designed and constructed by Eugene Henry Gavand at 1875 is the 3rd. Metro and 2nd underground railway system in the world after Washington Metro (1868). In this paper, the acoustics of Istanbul Tunnel are investigated. This is a special case which sets up a challenge to these prediction methods. The shape of the tunnel and therefore focusing the sound, reverberant wall, and therefore fluctuation effect demands high accuracy in predicting the early reflections. The energy dissipates quickly in this type of enclosures and there is little masking effect of the reverberation. Another aspect that has been shown to give very different results in this case study is the geometrical detailing of the models.

When Istanbul Tunnel is compared with modern metro systems; nowadays railway systems are controlled by modern electronic and mechanical system, but in 19th century these electronic systems were not available. Solution could be finding with the shape of the building. The aim of this paper is to clarify some of the problems that can arise in this type of constructions, and give guidelines for how they can be overcome / avoided. Another objective is to emphasize that room acoustic computer simulations although very useful need careful consideration about the underlying calculation methods.