ACOUSTICS2008/791
Predictions of sound pressure levels in streets using a diffusion model: numerical validations and experimental comparisons

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Predictions of sound propagation in urban areas have attracted a considerable over the years. If the sound energy is assimilated to particles with a constant energy, their movement can be described by a transport equation. In canyon streets, this transport equation can be reduced to a diffusion equation whose expression is more simple. In this presentation, sound absorption at the boundaries (buildings facades and ground), as well as atmospheric sound attenuation are introduced. The problem is then solved numerically using a finite elements method for the configuration of a canyon street. A systematic validation of the obtained model is carried out in terms of sound pressure level by comparison to numerical simulations taken from the literature. Comparisons with experimental data are then conducted. Finally, applications in more complex configurations are presented.