

ACOUSTICS2008/1121 BEM analysis of plane waves scattered from periodic surfaces

Mahesh Bansal^a, Wolfgang Ahnert^b and Stefan Feistel^b

^aInstitute of Technical Acoustics, Tech. Univ. Berlin, Einsteinufer 25, 10587 Berlin, Germany

^bAhnert Feistel Media Group, Arkonastr. 45-49, 13189 Berlin, Germany

Periodic surfaces like stairs, seats and repetitive designs on walls are very common and integral part of room acoustics. Effective simulation of the sound field inside enclosures requires the investigation of scattering from such periodic surfaces. In this work, we perform BEM analysis to calculate the scattering coefficients of different samples. For comparison purposes we also introduce a simple point-source based model to calculate the scattered wave fronts. Both approaches are implemented in a computational tool called EASE Scatterer. The incident plane waves are considered at various angles and scattered waves computed in both models are then compared with the measured data. It is found that while the point-source model can give reasonable asymptotic results, the BEM model matches with the measurement data significantly better in quantity and quality. Moreover, a study by varying the number of periods for the given sample is also performed.