I Abstract

This thesis investigates the effect of a low-height noise barrier on the reduction of traffic noise. The effectiveness of two different types of low-height noise barriers, thus different surfaces, was studied. The first type was a 2-D surface in the form of parallel walls, the second type a 3-D surface in the form of squared lattices.

The idea of using squared lattice instead of parallel walls is to have the same effect on noise attenuation, no matter what angle the sound source is positioned to the barrier. The effect of different types of barriers was illustrated by measuring the insertion loss.

To be able to investigate the effectiveness of different barriers, with different geometrical dimensions in real life street situations, simulations were used. The use of simulations is required because it is unviable to build a variety of real size barriers and measure the effect.

In order to be able to use simulations it had to be demonstrated that the traditional method to simulate 2-D boundaries (Boundary Element Method) can also be used to simulate 3-D boundaries. To demonstrate this experimental set-ups were created in the anechoic chamber. Measurements from the anechoic chamber were afterwards compared with simulations of 2-D and 3-D boundaries using the Boundary Element Method. After demonstrating that BEM can be used for 3-D predictions it remained to demonstrate that it is possible to simulate boundaries correctly not only under simply and small conditions, but also under real street conditions.

Real-life street set-ups were predicted and evaluated.

One of the predicted boundaries was then actually built on a parking-space at the Open University in Milton Keynes. The effect of this boundary on noise reduction was measured and the measurements were compared with predictions. As a result of this comparisons the usefulness of the total level difference, a key value produced by simulations, for laymen has to be questioned.

Finally, to be able to predict a real street scenario it is necessary not to be restricted to one noise source (usually multiple cars are passing a noise barrier). To be able to include multiple noise sources a more sophisticated simulation program is needed, the multi-source and multi-receiver program. The usefulness of this program for predicting low-height noise barriers was assessed. Based on the simulations from the multi-source and multi-receiver program the most effective dimensions of a low-height noise barrier in a real street scenario were determined.