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Design and evaluation of novel barriers

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This work presents the results of a project for the design of novel noise barriers with improved performance. The aim of the project was twofold. First, to optimize the performance of barriers by appropriately modifying both the shape and the acoustical conditions at the edge to suppress the sound pressure. Second, to quantify the acoustic performance of the novel barriers both mathematically and experimentally in a standardized, well controlled process. The insertion loss of different types of barriers with modified edge shapes and acoustical conditions were investigated systematically in comparison with conventional ones using a method based on BEM. The comparison highlighted the influence of shape and edge configuration on barrier efficiency and allowed the design of novel barriers with optimal performance. The novel barriers were tested and their efficiency was quantified experimentally using the Maximum Length Sequence (MLS) technique, which offers the advantage of in-situ measurements in the presence of extraneous noise. The experimental results are shown to be in good agreement with the experiments. Based on the aforementioned procedure, a unified framework was established, witch allows the design of potentially improved noise barriers.