

Investigating Noise Propagation in Urban Environments using Spectral Element Method: A Comparative Study of Train Horns and Church Bells

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Abstract

Noise pollution is a growing concern in urban environments as societies become increasingly urbanized. With limited area for development, urban infrastructure must either be built upward or in closer proximity to noisy areas such as airways, railways, and highways. This study investigates the propagation of noise in an urban environment generated by train horns and church bells using the spectral element method. The aim of this research is to gain a better understanding of how these sources contribute to the overall noise levels in the city and to identify potential hot spots of high noise exposure. The spectral element method was chosen as the numerical tool for this study because of its ability to accurately model the complex geometries that are often present in urban environments. Results from the simulation are compared with real-world measurements to validate the accuracy of the model. The findings of this research have the potential to provide valuable information for urban planners and decision-makers in their efforts to mitigate noise pollution in densely populated areas. Chronic exposure to high levels of noise has been shown to negatively impact human health and well-being, making it a pressing issue for urban environments