

Prediction, Control, and Assessment of Environmental Noise

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As environmental noise issues, transportation noises from road traffic, railways and aircrafts have been typical problems so far. Concerning the road traffic noise problem, in Japan, many useful countermeasures such as edge modified barriers have been developed and adopted among various road sections. Regarding the road traffic noise prediction, the methods by using computation are roughly categorized in two groups; the one is an engineering method on energy-base, and the other is a precision model based on wave theory. As a research on energy based calculation method, the author has been concerned with development of ASJ RTN-Model, which is now widely used as the standard engineering calculation model for environmental noise assessment in Japan. On the other hand, wave-based methods using FEM, BEM and FDM are advancing day by day, with the progress of the computer technology. However, the wave-based method is difficult to be applied to outdoor noise propagation because huge computational resource should be required to simulate the noise propagation with wide frequency range in relatively large domain. Although such a principal problem exists in the numerical simulation based on the wave theory, the method can be efficiently used as a powerful tool for road traffic noise prediction, when comparably detailed area is focused on, or a certain simplification such that the noise source is modeled in coherent or incoherent line source can be assumed. In reality, the line source assumption is applicable to many cases for road traffic noise prediction. Furthermore, the wave-based method also can be utilized for the development of the engineering model.

As a novel environmental noise issue, wind turbine noise problem is being closed up. For the problem, both of physical characteristics of noise generation and propagation and psycho-acoustical effects on man at a receiving site are equally important. The author dealt with the wind turbine noise issue and performed psycho-acoustical experiments mainly focused on a human response. The outcome of the research will be introduced, and remaining problems will be discussed.