National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Simulation and Experimental Verification for Acoustic Attenuation of Intuitive Designs of Periodic Scatterers and Combination with Acoustic Panels
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Venue	: MS Teams, (code: fc2r8nb)
Date and Time	: 14 Dec 2021 (5:00 PM)
Abstract	: Noise pollution carries many associated health risks. Outer noise pollution can come in many forms and pose challenges to reduce them. Periodic scatterers is one of the best solution for outdoor noise control and act as noise barrier. Array of periodic scatterers are also known as sonic crystal and have the potential to attenuate noise in certain frequency range due to the effect of Bragg scattering. The numerical and experimental methodology for calculating IL (insertion loss) and band gap of periodic cylindrical and C-shaped scatterers has been benchmarked and validated with a good agreement. Observed IL has been improved by converting vertical slit of scatterers to helical slit. For vertical slit, the tuning factors are rotation of slit angle, slit width, thickness of the scatterers. However, the angle of rotation has no impact on IL with helical slit scatterers. Further, the IL has been enhanced by taking the multi resonant scatterers made with combinations of two coaxial resonant scatterers (C-shaped and perforated). Out of four possible combinations of multi resonant scatterers, an improved IL has been observed by taking perforated scatterers inside C-shaped scatterers, which is named as CP scatterers. Apart from Bragg band, three additional peaks are also observed, where two peaks in IL are due to local resonances and the third peak is observed in the direction of wave propagation due to dipolar resonance of the hollow cavity. Next, IL has been enlarged in broadband regime by inserting porous panels within the rows of periodic scatterers. At last, the free field IL and ER (Echo Reduction) are calculated for finite size periodic scatterers via time domain simulations. Experimentation has been done in a room environment which eradicates the necessity of an anechoic chamber.