National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Acoustic Attenuation of Periodic Helmholtz Resonator and Their Use in Designing Periodic Scatterers for Outdoor Noise Control
Speaker	: Janmenjay Dandsena (Rollno : 516id6004)
Supervisor	: Prof. Dibya Prakash Jena
Venue	: MS Team : Meeting Code - 588zy8y
Date and Time	: 16 Mar 2022 (5.00 PM)
Abstract	: The research starts with the investigation of Helmholtz resonator in search for acoustic metamaterial. The classical transfer matrix technique is adopted for the analytical investigation. To validate this investigation, simulation is performed based on ASTM E-2611 followed by experimental study in transmission loss tube test setup. Acoustic properties of the Helmholtz resonator are analysed through transmission loss plot and the respective effective properties such as bulk-modulus and density. The research moved one step forward by adding multiple resonators to a single Helmholtz resonator. A total of six different Helmholtz resonators have been selected to arrange in eight different configurations. The research also focuses on the acoustic wave propagation inside an acoustic unit consisting of duct, Helmholtz resonator, perforated plate and micro perforated plate. These designed configurations reveal the possibility of achieving double negative acoustic metamaterial in broadband. The next focus moved to the analysis of a Helmholtz resonator integrated with porous material. Three distinct combinations of such Helmholtz resonator with porous core are designed for the investigation. This section also extends its study to array of Helmholtz resonators with finite size. The final stage of this research focus to incorporate Helmholtz resonator concept in real life noise reduction problems. It includes the study of noise level of outdoor unit of split type air-conditioners. The desired frequency bands to be attenuated has been identified and a tuneable multi-resonant scatterer is suggested with certain geometrical constraints. Fabrication, characterization and deployment of the scatterer to attenuate over all noise level in audible frequency range is discussed. the air flow from the outdoor unit and its influence along with insertion losss measurements with different location is examined.