香港聲學學會
Hong Kong Institute of Acoustics

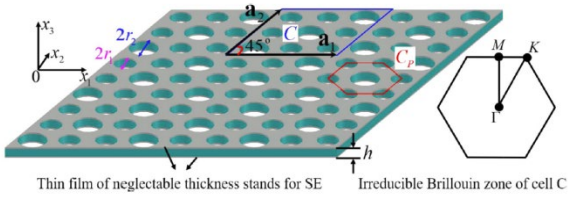
Supporting organizations

Technical Webinar on:
Topologically Protected Wave Propagation in Acoustic Metamaterials

Date: 15 November, 2022 (Tuesday)
Time: 7:00 pm – 8:15 pm (1 CPD hour)

About the Seminar

Topological acoustic metamaterials have attracted enormous research attention in recent years. A significant hallmark of these structures is that they can support interface modes that are robust to structural disturbance and protected by topology. However, most of the studies are often limited to the passive structures that manifest wave propagation at fixed frequency ranges. In view of the shortage of non-passive topological acoustic metamaterials, this work has a primary motive to study the active control of topologically protected wave propagation in soft dielectric membrane-type metamaterials (MAM) based on quantum spin Hall effect (QSHE). The plane wave expansion method is adopted to analytically capture the system dispersion properties. A finite element model is further developed and excellent convergence with the analytical result is presented. By adjusting locations of spraying discs in the honeycomb unit cell, mode shape inversion is observed, separating the topologically trivial state from the nontrivial counterpart. Consequently, the topologically protected interface modes (TPIMs) are observed. Additionally, an electrical voltage that lies within the locking-up limit is applied to MAM to actively control the working frequency of the TPIM. Further, several waveguide paths are designed to control the robust wave propagation in the structure. Conclusively, a voltage-controlled topological metamaterial is designed to actively tune the working frequency range of the device.



(Zhou et al., Appl. Math. Model., 2020)

About the Speaker

Ir Prof. C.W. Lim is currently a fellow of ASME, ASCE, EMI and HKIE, Ir Prof Lim received BEng from Univ of Tech of Malaysia, MEng and PhD from National Univ of Singapore and Nanyang Technological Univ, respectively. Prior to joining CityU, he was a post-doctoral research fellow at Univ of Queensland and HKU. He is one of the editors for JoMMS, Assoc Editor for JVET, IJBC, JTS, Subject Editor for AMM, JSV, etc. He has published one very well-selling title entitled "Symplectic Elasticity" as recorded by World Scientific, over 360 international journal papers, accumulated over 13,500 citations and has a Google Scholar H-index 60. One of his papers has been cited over 1,000 times since it was first published in JMPS in 2015. Another paper was granted the IJSS 2004-2008 most cited article award. He was also awarded Top Referees in 2009, Proc. A, The Royal Society. Prof Lim is a registered professional engineer in HK. He holds one registered finite element software and three patents. Recently he was awarded the prestigious 2020 JN Reddy Medal as a recognition "for significant and original contributions to vibration of plates and shells, smart piezoelectric structures, nanomechanics, and symplectic elasticity".

Registration

Please complete the online registration by 13 November 2022 (Sunday) via https://forms.gle/9F8r5aD8NbgfHPrh7. The seminar is free of charge and open to all.

CPD Certificate in electronic format will be provided via email after the seminar.