Acoustic Metamaterials for Underwater and Biomedical Applications

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Abstract— Over the past few decades, acoustic metamaterials have been demonstrated to achieve a wide range of applications including sensing, communication, wave engineering, and so on. To date, most successful implementations have been realized in the air with the help of advanced manufacturing techniques. This talk discusses some recent developments of acoustic metamaterials that exhibit anisotropic properties for underwater usage. The design approach and their characterization techniques are introduced. We then present the application of metamaterials in aqueous environments. Examples include generating on-demand acoustic fields such as pressure gradients and vortex fields for the manipulation of particles. These demonstrations are strongly tied to biomedical applications and may open up new possibilities by bringing up fresh ideas enabled by acoustic metamaterials.

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