

Extraordinary Transmission of Sound using Membranes

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We realized the extraordinary acoustical transmission through a subwavelength hole with membranes. The key role played by membrane resonance in transferring sound efficiently from the input to the output region is presented. Potential application includes concentration of acoustic energy.

It is a direct manifestation that transmission efficiency using our membrane resonator is about 10~20 times higher than that of using their Fabry-Perot resonator. This intensity transmission coefficient is an extremely high value of 72% and 57% within the measured frequency regime, whereas for the structured our membrane a peak at 414Hz and 633Hz each as shown in Fig. 1.

In conclusion, We present the first experimental realization of extraordinary acoustical transmission using membrane resonator which has high quality factor. The presence of membrane resonator leads to a wide variety of unexpected acoustic properties such as strongly enhanced transmission of acoustic through the hole and concentration of acoustic energy. It is great structure inserted membrane resonator for energy transmission while blocking the air flow. This knowledge is opening up exciting new opportunities in applications ranging from subwavelength acoustics to chemical sensing and biophysics. It shows novel result for wave and material physics. With great possibilities, EAT using membrane resonator can give a new way of energy and information transferring techniques.

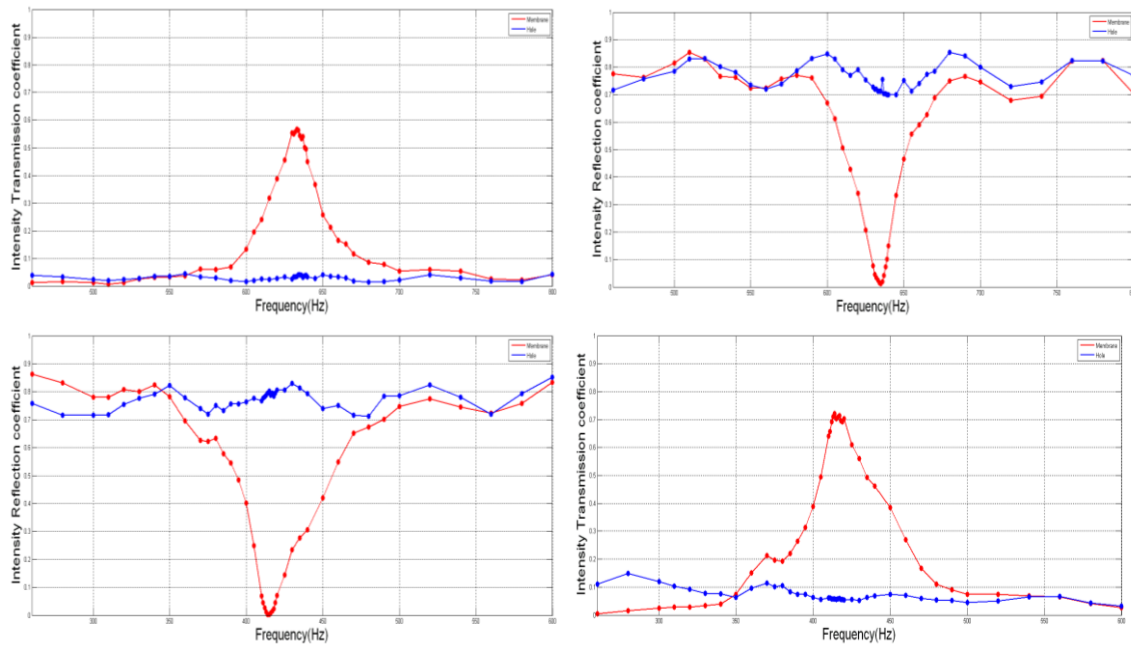


Fig. 1. Enhanced Transmission Data

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