

The Study of Rib-stiffened Flexibly Supported Square Flat-panel Loudspeaker

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ABSTRACT

Two parts are discussed in the thesis. First part is the fabrication of beam-type elastic suspensions of loudspeakers, including the choices of supporting materials and the geometrical shapes of the elastic supports. The purpose of the use of the beam-type elastic supports in the design and fabrication of the speakers is that the speakers can have low first resonant frequency, the radiating plate can vibrate in a steady way, and the radiating efficiency in low frequency range is improved. Furthermore, the elastic supports are designed in such a way that the noise due to instability can be reduced, and the weight of the radiating plate can also be reduced. The purpose of elastic suspensions can make the flat-panel speaker with small area have good performance in low frequency. Second part is focused on the use of composite materials to stiffen the radiating plate so as to suppress the mid-frequency dip. In the design of the stiffened plate, the finite element software ANSYS is used to study the vibration of the plate. Different stiffened radiating plates are designed for simulating the SPL curves of the speakers. The speakers fabricated using the proposed method are tested to measured the SPL curves of the speakers. The experimental results are used to verify the feasibility of the proposed design of the speakers.