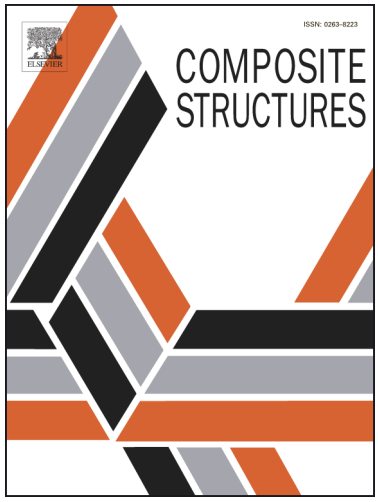

Double resonant porous structure backed by air cavity for low frequency sound absorption improvement

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Double resonant porous structure backed by air cavity for low frequency sound absorption improvement

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Abstract

In this study, multi band sound absorbing structure with double resonant porous structure (DRPS) employing slit porous medium was proposed. Sound absorbing materials are widely used for noise reduction in various industrial fields. When the porous medium's thickness increases, better absorption efficiency is appeared at low frequency bands. Since the thickness should be small, the noise reduction performance at low frequencies is inacceptable for practical applications. Proposed structure was composed of slit absorber in helical shape attached to perforated membrane backed by air medium. Its acoustic characteristics were controlled by adjustment of design parameters which is essential for specific noise control applications. To confirm acoustic characteristics, three samples were made and comparison analysis was performed. Sound absorption coefficients were measured using two-microphone impedance tube to verify its acoustic performance. Proposed structure exhibited better low-frequency sound absorption compared with the conventional porous medium's results. The measurements showed significant sound absorption improvement at low frequency bands without sacrificing performance in mid and high frequency bands. Acoustic impedance of DRPS was calculated and compared with measured result. The sound absorption mechanism was composed by Helmholtz resonator, perforated membrane and slit porous medium's effect. Parametric study was conducted for achieving optimal sound absorption efficiency.