

Effect of porosity, pore size, and pore-opening size optimized on the sound absorption coefficient of aluminum foam

Abstract

Metal foams are interesting as sound absorbers because of their strength, low mass, high hardness, and damping. To foam fabrication more accurate and achieve higher sound absorption coefficient (SAC), the effective parameters should be optimized. In earlier study (DOI: 10.32604/sv.2021.09729), the parameters of porosity percentage (Ω), pore size (D) and pore opening size (d) were optimized by the authors. In this study, we intend to investigate the effect of optimized Ω percentage, D size and d size on the SAC of aluminum foam in the frequency 0 to 8000 Hz with the thicknesses of 5, 10, 20, and 30 mm. The genetic algorithm was performed employing the Lu model, using MATLAB software. According to the results, the optimum values of Ω , D, and d at different frequencies and thicknesses are not constant. That is, at any given thickness and frequency, there are specific optimum amounts. This study provides a way to improve the SAC performance of porous metal materials for various and targeted applications.

Keywords

Acoustic wave absorption; Aluminum; Genetic algorithms; MATLAB; Metal foams; Sound insulating materials