Numerical analysis of acoustic helicoidal resonator with Helmholtz resonator inside mandrel

Wojciech Łapka

Politechnika Poznańska
Pl. M. Skłodowskiej-Curie 5, 60-965 Poznań
wojciech.lapka@put.poznan.pl

This paper presents the results of a numerical analysis of an acoustic helicoidal resonator incorporating a Helmholtz resonator embedded within its mandrel. The study investigates the impact of varying the Helmholtz resonator's cavity volume and the position of its neck on the transmission loss characteristics of the selected helicoidal resonator placed inside the cylindrical duct. The results demonstrate that strategic placement of the Helmholtz resonator within the mandrel can enhance the overall attenuation performance of the system up to the cut-off frequency of the duct. By adjusting the cavity volume, additional discrete attenuation peaks can be achieved across a broad frequency range. The findings reveal a novel approach to synergistically combining the properties of two distinct acoustic resonators, offering new possibilities for sound attenuation control in duct systems.