

# Absorption coefficient of perforated plates backed by a porous material under high sound excitation: The holes interaction effect

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The sound absorption coefficient of perforated plates backed by a porous material is studied under high sound excitation considering the holes interaction effect. The theoretical considerations are based on the equivalent fluid approach following the work by Atalla and Sgard [J. Sound Vib. **303**, 195–208 (2007)] and the use of the transfer matrix method. To take into account the high sound levels effects, the air flow resistivity of each layer is modified following the Forchheimer law. Eight specimens of perforated plate with different centre-to-centre holes distances are built and tested when backed by a polymeric foam. A specific impedance tube setup is developed for the measurement of the surface acoustic impedance for sound pressure levels ranging from 90 dB to 150 dB at the surface of the perforated facing. The particular cases of holes interaction effect with variable porosity and of holes interaction effect with constant porosity are depicted. The effect of holes interaction is observed to modify the maximum of absorption coefficient at the frequency of resonance studied. To corroborate the validity of the presented method, measurements and prediction are compared and discussed in the case where the MPP and the porous material are both directly backed by a rigid wall.

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