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ANTONIO FERNÁNDEZ: Aerogel-based metasurfaces for perfect acoustic energy absorption

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Silica aerogels are nanoporous lightweight materials the frame of which consists of an assembly of connected small cross-sections beam-like elements resulting from fused nanoparticles. This particular assembly additionally provides silica aerogel a very low elastic stiffness when compared to rigid silica structure of identical porosity. Therefore, when aerogel plates are clamped, they are excellent candidates to design acoustic metamaterials, because they exhibit subwavelength resonances and present efficient absorption capabilities. In this work we will study theoretically, numerically and experimentally a perfect absorbing metamaterial panel made of periodically arranged resonant building blocks consisting of a slit loaded by a clamped aerogel plate backed by a closed cavity. The impedance matching condition is analyzed using the Argand diagram of the reflection coefficient. The lack or excess of losses in the system can be identified via this Argand diagram in order to achieve the impedance matching condition. The results obtained show a good agreement between the analytical results and those measured experimentally.

Session Classification: SHORT TALKS

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