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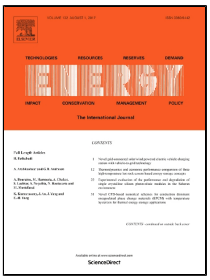

Open-cell foams for thermoacoustic applications

Marialuisa Napolitano, Rosario Romano, Raffaele Dragonetti

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Open-cell foams for thermoacoustic applications

Marialuisa Napolitano, Rosario Romano, Raffaele Dragonetti

Università degli Studi di Napoli Federico II, Dipartimento di Ingegneria Industriale, P.le Tecchio 80, 80125, Napoli, Italia

Corresponding Author: Raffaele Dragonetti - dragonet@unina.it

Abstract

In this work the thermoacoustic performance of a stack realized with open-cell foam is analysed. Starting from the elementary cell and its strut parameters the pore structure has been investigated to improve the power conversion inside a standing-wave thermoacoustic engine. The so called "Johnson-Champoux-Allard" model is used for this scope. Results are compared with those provided by ordinary stack realized with straight pores whose cross-sections have regular shapes (i.e. circular, parallel plate). Since thermoacoustic performance is strongly affected by stack properties (such as its length, its porosity, the geometry, the shape of its pores, the operating frequency as well as the type of material), an optimization procedure has been used to optimize the thermoacoustic engine performance for the same working conditions (thermal power provided by the heat exchangers and the related temperatures).

This study reveals that, for the investigated working conditions, partially reticulated open-cell foams have the best performance with respect to fully reticulated open-cell foams and the traditional stacks.

Key words: *open-cell foams, stack, standing-wave, thermoacoustic engines, strut parameters*