

**Creation of a local sound source using bandgap**  
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**Abstract**

The main aim of this paper is to present the application of bandgap to create a local sound source on a panel structure. The bandgap is an extraordinary wave attenuation phenomenon induced by periodically arranged elements, such as scatterers, local resonators, and inertial amplifications. Owing to the significant vibration reduction, this effect has led to vibro-acoustic applications mainly focusing on the reduction of structure-borne noise. Here, we broaden the application range to create a sound source on a vibrating panel structure. The main idea is to localize vibration near the excitation point to create a piston-like vibration pattern which is highly efficient for sound radiation. To illustrate the idea, the one-dimensional beam model with periodically placed local resonators is examined and with this theoretical model vibration localization and sound radiation efficiency are analyzed. Experimental validation is carried out on a panel structure. For the specific case, the increased sound radiation efficiency up to 10 dB at frequencies above 2 kHz is demonstrated.

**Keywords:** *Sound radiation; Vibration; Bandgap; Metamaterial;*

**Biography**

Dr. Jaesoon Jung is a postdoc at Acoustic Technology, Electrical Engineering, Technical University of Denmark, DTU.