

## **Determination of band gaps of 2D elastic finite periodic structure by BEM**

**\*H. F. Gao<sup>1</sup>, T. Matsumoto<sup>1</sup>, T. Takahashi<sup>1</sup>, H. Isakari<sup>1</sup>**

<sup>1</sup>Department of Mechanical Science and Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya, Japan.

\*Corresponding author: gao\_h@nuem.nagoya-u.ac.jp

In this research, the boundary element method (BEM) is applied to the analysis of the frequency-banded nature of an elastic finite periodic structure, and a size-reduced matrix is derived based on the periodic part. By formulating the system matrix for a unit cell, the quantities on the free boundaries are removed from the whole system matrix, and in order to investigate the frequency banded nature of the structure, a contour integral method is employed for extracting the eigenfrequencies of the finite structure, because of the nonlinear property of the eigenvalue problem resulted by BEM. The numerical simulations show that the eigenfrequencies also present a frequency-banded distribution in the frequency domain, and show a good agreement with the dispersion relation.

**Keywords:** Finite periodic structure, BEM, contour integral method, eigenvalue, band gaps