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Optimization of Beam Properties with Respect to Maximum Band-Gap

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We study numerically the frequency band-gap phenomenon for bending waves in an infinite periodic beam using Floquet theory. The beam is supposed to consist of an infinite number of identical base cells made up of two different materials. The outcome of the analysis which is a dispersion relation is then subjected to an optimization problem in order to maximize these band-gaps. The band-gap maximization may be performed with respect to material parameters and cross-sectional geometry. We have numerically investigated a base cell with constant cross-section consisting of two materials with high contrast in Young's modulus (Zinc-Chromium) as well as a base cell consisting of two materials (Zinc-Silicon) with a high contrast in mass density in order to obtain preliminary results indicating which parameters might be of importance concerning the size of the band gaps.

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