ACOUSTICS2008/1562
K-dependent polarization of sagittal acoustic waves in phononic crystals

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By calculating the longitudinal and transverse strain energy averages we studied the polarization states of sagittal acoustic waves in one - and two - dimensional phononic crystals. Our theoretical results show the continuous variation of the field displacement components when the Bloch wave vector sweeps the Brillouin zone; thus, the vibrational modes of a same dispersion curve can have different polarization. First we present the polarization map of sagittal waves for an epoxy/Sn superlattice. Then we discuss the band polarization of an array of cylindrical holes in epoxy. As we shall see, the mixed modes can be either predominantly transverse of predominantly longitudinal. For calculations we have used an energy balance criterion.