

Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Negative bi-refraction of acoustic waves in sonic crystals YAN-FENG CHEN, Nanjing University, NATIONAL LABORATORY OF SOLID-STATE MICROSTRUCTURE COLLABORATION — Optical birefringence and dichroism are classical and important effects originating from two independent polarizations of optical waves in anisotropic crystals. However, it is impossible for acoustic waves in the fluid to show such a birefringence because only the longitudinal mode exists. The emergence of an artificial sonic crystal (SC) has significantly broadened the range of acoustic materials in nature that can give rise to acoustic bandgaps and be used to control the propagation of acoustic waves. Recently, negative refraction has attracted a lot of attention and has been demonstrated in both left-handed materials and photonic crystals. Similar to left-handed materials and photonic crystals, negative refractions have also been found in SCs. Here we report the acoustic negative-birefracton phenomenon in a two-dimensional SC, even with the same frequency and the same ‘polarization’ state. By means of this feature, double focusing images of a point source have been realized. This birefracton concept may be extended to other periodic systems corresponding to other forms of waves, for example, electron for semiconductors, photon for photonic crystals, and plasmon for plasmonic crystals, showing great impacts on both fundamental physics and device applications.

Yan-Feng Chen
Nanjing University

Date submitted: 27 Nov 2007

Electronic form version 1.4