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### Refracting characteristics of backward propagating Lamb modes

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Lamb waves are acoustic modes propagating along thin plates or shells and result from the coupling of longitudinal waves and shear vertical waves (polarized along the thickness direction), taking place at the surface boundaries for satisfying the boundary conditions of the waveguide. Their nature being a composition of two differently polarized components, it permits that, for some combination of frequency and wavenumber, a Lamb mode is propagating which has its group velocity contradirected with respect to the phase velocity. These are the so called "backward" Lamb modes, and one of them takes place at the starting region (low wavenumber) of the  $S_1$  mode dispersion curve in aluminum. Peculiar features of a wavepacket of a symmetric Lamb mode  $S_1$ , backward propagating in an aluminum waveguide, are observed and anomalous behavior in refraction, diffraction and interference of this peculiar mode is experimentally put in evidence. Particularly, contradirected refraction is put in evidence, as it takes place at the boundary where a forward propagating mode is coupled to a backward propagating one, and change from forward to backward mode is obtained in case of a wedge shaped laminar plate, which goes through a zero point of the group velocity.