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# Reflection, refraction, mode conversion and guided waves on surfaces and interfaces of materials with all allowed Poisson ratios

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When encountering a mismatch of characteristic impedance a bulk acoustic wave transforms into up to three reflected and refracted waves of different polarizations. The effect is known as mode conversion [1]. The lack of the specularly reflected wave is called total mode conversion because then all the outgoing waves propagate at speeds different than that of the incident one. Conversely, if the only outgoing wave reflects in the specular way one speaks of no-conversion. Discovery of materials with negative Poisson's ratio [2] enlarged the range of possible impedance mismatch and of the related phenomena. The conditions for the total mode conversion, for no-conversion and for evanescent partial waves will be presented for half-space elastic media and for interfaces between two different elastic media also separated by a thin membrane. Additionally, the effects of total reflection and total transmission will be discussed in the latter cases. Some frequencies corresponding to these phenomena turn out to coincide with apparently spurious roots of the secular determinant giving, in principle, the frequencies of the surface or interface waves [3,4]. These results will be compared with the anomalies of local densities of states (LDOS) on the surfaces and interfaces. Of particular interest are maxima of and minima of LDOS corresponding to surface resonances and surface antiresonances respectively. Some sharp surface resonances mark the total mode conversion of bulk waves and broader resonances an analogous mode conversion of evanescent waves The effects of curved surfaces will be also summarized [5].

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