

## Generation and propagation of the fourth wave

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This study deals with influence of pre-existing (initial) stress on elastic waves. Brillouin (1925) investigated this problem based on the general formulation of elasticity by Poincare (1882) and Coccera(1909). An elastic parameter  $\nu$  is introduced, which represents pre-existing stress, in addition to the conventional Lamé constants  $\lambda$  and  $\mu$ . Under pre-existing stress parameters  $\mu$  and  $\lambda+2\mu$  are replaced by  $\mu-\nu$  and  $\lambda+2\mu-\nu$ , respectively. Effect of hydrodynamic pressure  $P$  is represented as  $\nu=P$ . This result is almost identical with the previous result obtained by using the lattice model for elastic solid (Ouchi, 2002). Biot (1940) derived different result and showed a hydrostatic pressure produce no effects on elastic waves. His approach, however, basically assumes infinitesimal deformation and if effect of higher order deformation is considered similar result is obtained. Influence of pre-existing stress is particularly significant in the case of tensional stress field, since present geophysical observation revealed tensional fields exist quite common in tectonic active areas and sometimes play an important role in actual tectonic processes. Under tensional stress, elastic waves may show eigen oscillations and quite efficient propagation for long distance, since tensional fields often localize and distribute one or two dimensionally.