



The effect of initial stress on seismic velocities and elastic coefficients

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The governing equations of wave propagating in one dimension elastic continuum materials are derived when the influence of its initial stress is taken into account. After a short review of the theory of initial stress is considered, it is indicated that the hydrostatic initial stress does not change the governing equation of wave propagation; it only changes the elastic coefficients and seismic velocities. Meanwhile, the initial stress has different influence on P-wave and S-wave velocity. In addition, velocities of P-wave and S-wave have been measured for granite samples at low uniaxial initial stress state. This and the analysis the previous data of seismic velocities of rocks under ultra-high hydrostatic initial stress state indicate that the seismic velocities and elastic moduli rapidly increase with increasing initial stress from 0 to 0.2 GPa, and then the increase slower and becomes linear from 0.2 GPa to 1 GPa.