



The effect of initial stress on seismic velocities and elastic coefficients

Ming Tao (1) and Xibing Li (2)

(1) China (mtao211@gmail.com) School of Resources and Safety Engineering, Central South University, Changsha, Hunan, China, (2) (xbli@mail.csu.edu.cn), School of Resources and Safety Engineering, Central South University, Changsha, Hunan, China

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 0.2GPa, and then the increase slower and becomes linear from 0.2 GPa to 1 GPa.