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Miller, D., Plumb, R., and Boitnott, G. (2013) “Compressive strength and elastic properties of a transversely isotropic calcareous mudstone,” *Geophysical Prospecting*, 61, 2, 315-328.

#### Abstract

This paper reports measurements of static and dynamic elastic properties plus compressive strength performed on a block of calcareous mudstone retrieved from an exploration well. Measurements of mechanical properties indicate that the mudstone is anisotropic with respect to all three properties. A detailed analysis of the elastic moduli computed using small unload reload cycles and simultaneous ultrasonic wave velocities shows both strong anisotropy and strong anelasticity. Surprisingly, the measurements are consistent with a mathematical description of a special type of anisotropic linear viscoelastic medium that is obtained by adding a set of compliant elements (e.g., contacts between clay particles, kerogen lenses, or micro-fractures) to an isotropic viscoelastic solid. This medium is fully characterized by density plus four parameters defining the viscoelastic solid and the excess normal compliance associated with the compliant elements. The mathematical model predicts a full set of parameters characterizing a transversely isotropic medium with a vertical axis of symmetry (a ‘tiv’ medium) for both low- and high-strain rate behavior.

Contact NER for more information.

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