ROZSA, R. B., Overview of laboratory experiments in support of the Lawrence Livermore Laboratory in situ coal gasification program, Underground Coal Gasification Sym., University of Wyoming, Laramie, July 28-August 1, 1975. [UCID-16845]

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A dilatancy model that seems capable of simulating the results of laboratory tests on rock samples is presented. The fundamental assumption incorporated in the model is that dilatancy is caused by cracks, which open in the least compressive stress direction. Its simplicity and compatibility with numerical techniques involving the simulation of both static and dynamic stress fields, permit prediction of dilatancy-induced effects for stress states and loading conditions that are not experimentally attainable.

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The temperature dependence of single-crystal elastic constants of synthetic stoichiometric $MgAl_2O_4$ spinel has been measured by the light-sound scattering technique in the Raman-Nath region. The crystal is set into forced vibration by a single-crystal $LiNbO_3$ transducer coupled to one crystal face. A He-Ne laser beam is diffracted by the stress-induced birefringence inside the crystal. The diffraction angle is determined from the distance between two spots exposed on a photographic plate by the first order diffracted beams as measured by a microdensitometer. The sound wavelength inside the crystal is then inferred from the laser diffraction angle. If the sound wavelength is combined with the measured transducer frequency, the velocity inside the crystal is determined typically to a precision of 0.05%. In this method, the measurement of velocity is not dependent either on the determination of sample length or on phase shifts at sample-transducer interface. Velocities of four pure modes, L// [001], T// [001], L// [110], and T// [110](P// [110]) are measured in the temperature range between 293 and 423 K. A linear temperature dependence is fit to the data by a least-squares method. Values obtained at 25°C from this linear fit are: