ENVIRONMENTAL/ENGINEERING GEOLOGISTS

HGS ENVIRONMENTAL/ENGINEERING COMMITTEE DINNER MEETING MAY 13, 1992

Time: 6:00 - 6:30 p.m., Social
6:30 - 7:30 p.m., Program

Location: Italian Market and Cafe
2615 Ella Blvd.
(behind Memorial Northwest Hospital)

Speaker: Jamal Ass'ad
Allied Geophysical Laboratory
University of Houston

Subject: Detection of Naturally Occurring Micro-fractures

JAMAL ASS'AD-Biographical Sketch

Mr. Ass'ad is soon to graduate from the University of Houston with a Ph.D. in geophysics. His research has been focused on fractured-induced anisotropy and the extraction of fracture parameters using seismic data.

DETECTION OF NATURALLY OCCURRING MICRO-FRACTURES

The effects of oriented cracks in rocks (azimuthally anisotropic medium) on seismic shear-wave propagation are characterized through scale-model seismic experiments utilizing disc-shaped inclusions in an isotropic epoxy matrix. Models built with rubber inclusions are analogous to fluid-filled cracks, microcracks, veins, and 'hard' inclusions. Shear-wave velocities are calculated using the first arrivals, and velocities measured from data for two different models with velocity (S1) is almost constant and in agreement with the calculated velocity for the isotropic medium. However, the slow shear-wave velocity (S2) decreases with increasing crack density up to a crack density of 10%, where a velocity increase is observed. This velocity increase at high crack density leads to a reduction in the velocity anisotropy (G). In contrast, for models with aluminum (stiff) inclusions, both fast (S1) and slow (S2) shear-wave velocities are increased. Consequently, a consistent increase of velocity anisotropy (G) is observed. Shear-wave splitting in the case of rubber (soft) inclusions is more pronounced than its counterparts with aluminum (stiff) inclusions. Results of this study may be applied to detecting and differentiating between fluid-and mineral-filled cracks, veins, microcracks, and inclusions.