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The Use of Bulk Modulus as a Fluid Indicator in Tight Clastic Reservoirs

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SUMMARY

Unconventional new methods capable of identifying pore fluid types in the subsurface can add significant contributions to gas exploration in tight reservoirs. We present a method for identifying, and hence selecting, the appropriate elastic rock modulus (or moduli) that are sensitive to pore fluid types. Seismic modeling work showed that, among all the moduli studied, the bulk modulus holds a great promise in discriminating between different pore fluids. This elastic rock modulus proved to be more robust than other techniques used in fluid distinction such as acoustic impedance or Poisson's ratio. This work also reveals that the bulk modulus provides good insight about pore fluids discrimination within reservoirs of low porosities (below 10%). Several examples of bulk modulus sensitivity to different pore fluid saturations will be shown from Saudi Arabian fields.