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Extended Range Particle Size Distribution Using Laser Diffraction Technology: A New Perspective

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Abstract

Grain size distribution has been traditionally characterized in the oil and gas industry using sieve analysis, settling tube analysis and thin section petrography. These techniques are relatively time consuming and more importantly, do not permit detailed classification of the silt and clay size fractions. Existing laser optics technology developed initially for the powder industry is mature, reliable and can be readily adapted to size distribution analysis of friable and unconsolidated sediments. The measurement range is sufficiently broad, the size determination is rapid and the data are reproducible. The laser optics data compare favorably with sieve analysis and settling tube analysis over traditional measurement ranges and the clay size fraction typically compares favorably with clay content determined by x-ray diffraction.

The extended range data can offer improved insight into well completion strategies, sedimentology, log evaluation and core analysis. From a well completion perspective, both sand and potentially mobile fines can be quantified. The application of the data in sedimentology to determine sediment uniformity can be enhanced since the entire distribution is typically measured. This permits accurate computation of Folk and moment sorting parameters. Also, the measurement range is such that classification of "soft" shales is practical. In addition to these typical applications of particle size distribution, the data have utility in log evaluation. The extended measurements range provides for rapid determination of Vshale on cores. Permeability values on percussion-style sidewall cores, typically determined by visual estimation, can be significantly improved with laser optics data.