Contribution ID: **235** Type: **Poster**

Non-Destructive Pore-Scale Approach to Evaluate Elastic Properties of Shale Samples by Imaging, Modeling and Simulation

Wednesday, 16 May 2018 17:15 (1h 30m)

Elastic moduli are amongst the most important parameters to assess the shale plays and to instruct the hydraulic fracturing. However, due to extremely high brittleness of shale and very limited samples available, the conventional methods to obtain elastic properties, for instance, uni-axial or tri-axial compression tests, often encounter with early breaking apart of shale samples, which leaves significant uncertainties on accurate evaluation of the elastic properties of shale samples. In this project, a new workflow to estimate the elastic moduli of shale samples is established with the aid of scanning electron microscopy (SEM) technique and numerical methods. 2D mineralogical map of the external surface of a shale sample is obtained by Energy-dispersive X-ray spectrum (EDS), from which not only the volumetric fraction but also the spatial correlation of each minerals is displayed. Finite element methods (FEM) is applied to this mineralogical map to virtually imitate compression tests based on the principle of least elastic potential energy. Taking advantage of the flexibility of simulation, anisotropy and representable issues of the studied mineral map are also presented to clarify some traditional controversial debate on the representative volume of this work flow due to its microscopic scale, at the same time shedding a light to the upscale of the elastic properties from microscopic scale to core analysis scale. Also presented in this work are comparisons of the calculated elastic properties with some existing models that evaluate the effective moduli at macroscopic scales.

References

Acceptance of Terms and Conditions

Click here to agree

Primary authors: Mr LYU, Weifeng (RIPED, PetroChina); Dr SUN, Langqiu (China University of Petroleum, Beijing); Mr LI, Danyong (OleumTech)

Presenter: Mr LYU, Weifeng (RIPED, PetroChina)

Session Classification: Poster 3

Track Classification: MS 2.15: Modelling and Simulation of Porous Media: From Microstructure to Functionality