Sensor development and calibration method for inline detection of viscosity and solids content of non-Newtonian liquids

*Development of standard reference material for non-Newtonian viscosity*

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To optimize, control and automate fluid flow during the drilling process, accurate and frequent measurement of the fluid viscosity, particle size distribution (PSD), solids content and density of the muddy fluid is required. This is currently done using manually operated, batch type sensors at the surface. However, the accuracy of these devices is limited and not sufficient to perform the required optimization and automation of the fluid flow during the drilling process. Moreover, no in situ calibration procedure exists that assures a maximum measurement uncertainty.

In 2014 a EMRP funded research project started that aims at tackling these issues. This will lead to vital information for inline measurement of drilling fluid properties, which is considered a crucial step in enabling drilling automation. In addition, an improved quality of viscosity, solids content and PSD measurement will be developed. This facilitates better fluid flow control over the drilling process and thereby enable improved modeling of drilling, ultimately leading to a more secure supply of fossil energy in Europe.

The objectives of this research project are:

* Increase the fundamental understanding of the metrological challenges that arise when measuring the viscosity of non-Newtonian liquids.
* Develop a viscosity standard for sensors for non-Newtonian liquids that are characterized by high apparent gel strength, highly shear thinning properties, and a large amount of suspended solids.
* Develop inline sensors that can measure viscosity, PSD, solids content and density for challenging non-Newtonian drilling fluids.

In the paper and presentation the current status will be discussed.

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