

Rheology for Efficient Energy Production and Conservation

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要旨

Presently, among all energy sources, liquid fuels are the leading source. The viscosity of liquid fuels plays an important role in energy production and energy conservation. For example, reducing viscosity of crude oil can speed up its transportation via pipelines and is the key to extract oil from oil sands and oil shale. Currently, the dominant method to reduce viscosity of complex fluid is to raise its temperature. This does not only require a large amount of energy, but also raises concerns of the green house effect in case of crude oil production and transportation. Recently, based on the basic physics of viscosity, we developed a new technology, which utilizes electric or magnetic field to change the rheology of complex fluid to reduce its viscosity, while keeping the temperature unchanged. The method is universal and applicable to all complex fluids with suspended particles in nano-meters, sub-micrometers, or micrometers.

This technology is energy-efficient since it only requires small amount of energy to aggregate the suspended particles. This seminar will present our research results applying this technology for efficient energy production and conservation.

We will report our research on efficient transport of off-shore crude oil and heavy crude oil. We will also discuss our research on efficient fuel atomization for internal combustion engine, which improves engine efficiency significantly. We will also show our research on bio-diesel production with this technology. While all these results are still at an early stage, they indicate that rheology plays very important role in energy production and conservation.

