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Reducing Viscosity of Liquid Suspensions by pulsed electric or magnetic field[1] R. TAO, Dept. of Physics, Temple Univ. — Viscosity of liquid suspensions is of great importance. Controlling the viscosity is vital in science and engineering. In electrorheological (ER) or magentorheological (MR) fluids, electric or magnetic field is used to increase the viscosity. However, in most cases we need to lower the viscosity. For example, reducing blood's viscosity improves circulation and prevents cardiovascular events. Lowering the viscosity of crude oil is the key to transporting offshore oil via undersea pipelines. Unfortunately, to date there are no effective methods for reducing the viscosity except by changing the temperature. In case that changing temperature is not an option, such as in the above examples, reducing the viscosity becomes formidable. Here we present a theory and experimental results showing that application of a suitable electric or magnetic field pulse can significantly reduce the viscosity of liquid suspensions for several hours with no change of temperature. The field induces dipolar interactions between the suspended particles and forces them to aggregate into large particles. The aggregation changes the rheological properties of the fluids and reduces the effective viscosity. Positive experimental results with MR fluids and crude oil indicate that this method, developed from the basic mechanism of viscosity, is universal and powerful for all liquid suspensions with broad applications.

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Rongjia Tao
Temple University

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