Aggregation kinetics in MR fluids

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We report experimental results on the aggregation kinetics in magnetorheological fluids subject to a constant uniaxial magnetic field using the technique of scattering dichroism. This technique yields a measurement of the number of aggregated particles, and therefore, it is a valuable tool for the study of the aggregation kinetics of dipolar micron sized particles since it is complementary to techniques more adequate to measure the average chain length, such as light scattering or video microscopy.

We show that the number of aggregated particles displays a long-time-power-law dependence with exponents that correspond to two different aggregation regimes depending on the values of the volume fraction and magnetic field. These exponents correspond to the 3D and 1D-like aggregation regimes respectively, when the number of aggregated particles is measured. The theoretical values of both time exponents for the number of aggregated particles has been calculated by considering the evolution equation for the density of isolated particles.