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Superparamagnetic colloids under rotating magnetic field FLORENCE MIGNOLET, GEOFFROY LUMAY, University of Liege — Colloids made of superparamagnetic micrograins offer the possibility to be controlled remotely with a magnetic field. This remote control enables various applications such as mixing, transport of fluids through microscale channels or propulsion in a viscous fluid. It is well known that when a constant magnetic field is applied on superparamagnetic colloids, they form long chains aligned with the field. When the magnetic field is rotating, a competition between magnetic and viscous forces takes place, leading to the rotation of the chains following the magnetic field along with the reduction of their length. The frequency of the rotating magnetic field is a key factor in these dynamics. When it is increased, we observe the formation of rotating clusters with frequencies that differ from the one of the field applied. In our work, we studied the influence of the field rotational frequency on the length and rotational speed of the chains as well as on the main features of the clusters. In order to have the needed temporal resolution, we used a microscope combined with a high-speed camera. Thanks to this technology, we were able to determine a critical frequency between the two regimes mentioned above.

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