

# **Ground state geometries and hysteresis loops of small granular ferrofluids as function of coating**

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## **Abstract**

A simple numerical algorithm to identify lowest energy configurations of a ferrofluid is presented. We consider the ferrofluid as a cluster formed by magnetic particles with constant magnetic moments and interacting through van der Waals and dipolar interactions. The minimal structure search is based on two strategies: to identify local minimum by simulated annealing methods and to search the energy potential surface by means of genetic algorithms. The mixing of these two methods improves the survey over the potential energy surface. In the non-magnetic limit, our algorithm recovers all known results for mono atomic clusters interacting through van der Waals forces, whereas in the presence of the magnetic interaction new structural geometries are found.