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Numerical simulation of the motion of superparamagnetic nanoparticle clusters in a pressure-driven channel flow with an external magnet PENGTAO YUE, SHERNITA LEE, Virginia Tech, SHAHRIAR AFKHAMI, New Jersey Institute of Technology, YURIKO RENARDY, Virginia Tech — The motion of a superparamagnetic hydrophobic ferrofluid cluster suspended in a viscous fluid undergoing pressure-driven channel flow is addressed, as a model for magnetic drug targeting through blood vessels. An external magnetic field is applied in order to attract the cluster toward a prescribed target. The transit time is obtained numerically and assessed for the influence of the background flow, cluster size, magnetic field strength and Brownian motion. We derive simplified estimates for the achievement of optimal capture rates in terms of the properties of the magnet and cluster size.

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