Colloidal homogenisation for the hydrodynamics of nematic liquid crystals

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Liquid-crystal colloids (LC colloids) are liquid crystals which contain clusters of microscopic particles. These microscopic particles yield novel material properties of the liquid crystal and thus allow for a broad new range of applications. In this talk I will report on recent results with Francesco De Anna and Arghir Zarnescu on the hydrodynamics of LC colloids. We investigate the homogenization problem of a simplified version of the Ericksen-Leslie equations taking into account the interaction of the liquid crystal fluid and the colloidal particles. We prove a separation of the velocity field and the director field in the limit equations. A key step in the proof is a novel version of the Aubin-Lions lemma, which us tailored for homogenization problems.