



北京大学力学与工程科学学院

Externally controlled colloid motions in viscoelastic fluids



报告人：曹鑫

上海交通大学物理与天文学院

时 间：9月29日（周一）15:00

地 点：北京大学新奥工学大楼3048

Abstract:

In colloidal physics people concern the motions of micro-sized particles in simple and complex fluid environment. This includes not only passive motions due to agitations of thermo energy but also controlled motions in presence of external forces or torques. In this talk I will show two of our recent research works regarding the controlled colloidal motion in viscoelastic fluids. In the first work, we demonstrate the observation of a microscale Magnus effect when rotating colloids are translating through the viscoelastic environment. We show that such microscale Magnus effect is a result of the slow structural relaxation of the viscoelastic media, which is very different from the inertial-driven Magnus effect at macroscale. In the second work, we demonstrate the observation of a backward sliding when colloid rollers roll on surfaces in viscoelastic fluids, i.e. the rollers slide backwards even though their rotation direction suggest forward motion. Via a combination of experiments, theory and computational fluid dynamic simulation, we show that such backward sliding is a direct result of a strong backward viscoelastic force caused by the surrounding viscoelastic fluid flow. Our work not only provides comprehensive understandings of colloid motions in viscoelastic fluids but also bears potential in applications such as particle sorting, steering and targeted delivery at microscale.

Biography:

曹鑫，上海交通大学物理与天文学院院长聘教轨副教授，2012年获北京大学物理学院学士学位，2017年获香港科技大学物理系博士学位，2017年至2022年在德国康斯坦茨大学物理系从事博士后研究工作。获得洪堡博士后奖学金（2018-2020）和国家海外优青资助（2023至2026）。曹鑫的研究课题涉及超稳定胶体玻璃态的形成机制，胶体晶体在晶体表面的定向轨道运动和摩擦，以及旋转胶体颗粒在非牛顿流体中的运动等，在Nature Physics, Nature Communications, Physical Review X等期刊发表多篇第一作者论文。目前，曹鑫课题组致力于研究外场操控下单个或多个微米颗粒在复杂环境中的运动，并探索复杂流体、空间微结构和颗粒间的相互作用对颗粒运动行为的影响。

欢迎校内外师生参加！联系人：沈在意 13701418087