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Mixing within a drop immersed in a fluid and subjected to translation and unsteady rotation. RODOLPHE CHABREYRIE, Department of Mechanical Engineering, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA, PUSHPENDRA SINGH, Department of Mechanical Engineering, New Jersey Institute of Technology, Newark, New Jersey, USA., NADINE AUBRY, Department of Mechanical Engineering, Carnegie Mellon University, Pittsburgh, Pennsylvania, USA., TOUNSIA BENZEKRI, CRISTEL CHANDRE, XAVIER LEONCINI, Équipe de Dynamique Nonlinéaire, Centre de Physique Théorique-CNRS, Marseille, France — The flow within a spherical drop induced by an external flow consisting of unsteady translation and rotation is studied using dynamical systems theory and direct numerical simulation tools. The goal being to optimize mixing within the drop, particle trajectories are traced and Liouville sections plotted from the corresponding Stokes flow. Both regular dynamics and chaotic advection are shown to occur. In the case of the latter, the chaotic sea may be rather localized within the drop. Parameter values are then varied in order to optimize the volume of the chaotic region. These results are then compared to those obtained by using direct numerical simulations based on the Level Set Method (LSM).

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