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Mixing by steady flows in thermocapillary driven droplets¹ DMITRI VAINCHTEIN, JOHN WIDLOSKI, ROMAN GRIGORIEV, Georgia Institute of Technology — We consider mixing via chaotic advection in microdroplets suspended at the free surface of a liquid substrate and driven using the thermocapillary effect. We illustrate that the mixing properties of the flow inside the droplet can vary dramatically as a function of the physical properties of the fluids and the imposed temperature profile. We show that proper characterization of the mixing quality requires introduction of two different metrics. The first metric determines the relative volumes of the domains of chaotic and regular streamlines. The second metric describes the time for homogenization inside the chaotic domain. We compute both metrics using perturbation theory in the limit of weak temperature dependence of the surface tension coefficient at the free surface of the substrate.

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