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Francois Frenkiel Award Lecture: Thermocapillary migration of interfacial droplets

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Thermocapillary migration of bubbles through the bulk liquid—a process in which tangential surface stresses arising from the variation of surface tension with temperature create a propulsive force on the bubble—has been extensively studied in the past. In contrast, the motion of droplets confined to the free surface of a liquid substrate has received much less attention. Recent developments in microfluidics provided new motivation to understand how applied thermal gradients can affect the motion of, and mixing inside, small aqueous droplets. In particular, the quality and speed of mixing depend rather sensitively on the flow structure inside the droplet. In this talk we describe different approaches that allow one to compute both the flow inside interfacial droplets and the flow in the layer of liquid substrate supporting the droplet and the lessons which can be learned by analyzing these flows.

¹Roman Grigoriev is the co-author of a paper on which this talk is based.