

Abstract Submitted
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Viscous Marangoni migration of a drop in a Poiseuille flow at low surface Peclet numbers ON SHUN PAK, JIE FENG, HOWARD STONE, Princeton University — The motion of a spherical drop with a bulk-insoluble surfactant immersed in a background flow in the low surface Peclet number and low Reynolds number limits is investigated. We develop a reciprocal theorem that applies to any prescribed background flow, and provide a specific example of an unbounded Poiseuille flow. Analytical formulas for the migration velocity of the drop are obtained perturbatively in powers of the surface Peclet number. We show that the redistribution of surfactant due to the background flow acts to retard the motion of the drop, with the magnitude of this slip velocity independent of the drop's position in the Poiseuille flow. Moreover, a surfactant-induced cross-streamline migration of the drop occurs towards the center of the Poiseuille flow, with its magnitude depending linearly with the distance of the drop from the center of the Poiseuille flow.

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