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Thermocapillary Migration of Bubbles in Polygonal Tubes ALI MAZOUCHI, Stanford University, GEORGE HOMSY, Stanford University — Thermocapillary migration of long gas bubbles in cylinders of regular-polygonal or rectangular cross sections is studied. An imposed axial temperature gradient produces a gradient of surface tension leading to a steady migration of the bubble towards the hotter region. The focus of our work is on predicting this migration speed. A leading order approximation for the bubble speed is found by computing the volume flux through the corner regions of the cylinder, which provide a parallel channel for the flow of fluid driven by the Marangoni stress. A global mass balance is used to relate the dimensionless bubble speed to the modified capillary number $\Delta\sigma^* = \frac{\gamma_T \beta a}{\sigma}$, where β is the temperature gradient, a the tube length scale, σ the mean surface tension, and γ_T the temperature coefficient of surface tension. The speed is found to be linear in this parameter at leading order. The approximation is improved by accounting for the deposition of a thin film on the cylinder walls at small capillary number. A modified Landau-Levich equation governs the thin film profile, the solution of which allows the calculation of the additional flux so produced. It is found that corrections in the bubble velocity become nonlinear at higher orders in $\Delta\sigma^*$. For regular-polygonal tubes with small number of sides or low aspect ratio rectangular cross sections, most of the flux passes through the corner regions, while for larger numbers of sides or large aspect ratios, flow in the thin film regions dominates.