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Steady thermocapillary-driven motion of a gas bubble in a tube ALI MAZOUCHI, Department of Mechanical Engineering, Stanford University, GEORGE HOMSY, Department of Chemical Engineering, Stanford University — The steady thermocapillary motion of a bubble in a tube filled with liquid and subjected to a constant temperature gradient is analyzed at small Reynolds, Peclet, and Bond numbers. The viscosity of gas is assumed to be negligible in this analysis. For small Capillary numbers, $Ca = \mu U/\sigma$, defined using the unknown bubble velocity, there are transition regions that asymptotically connect the cylindrical constant film thickness region of the bubble to its two constant curvature spherical caps. The lubrication theory in transition regions results in an ordinary differential equation (ODE) with the unknown thermocapillary velocity as a parameter. The transition regions and the curvature of the two caps are calculated through the numerical solution of the ODE. The balance between viscous and pressure forces on the bubble then determines the bubble velocity as a function of its length, imposed temperature gradient, and the physical properties of fluid.