Surfactant effect on the motion of long bubbles in capillary tubes
PRABIR DARIPA, Texas A&M University — In this talk, we give a theoretical proof of the thickening effect of surfactant by considering a small concentration of surfactant Γ and variable surface tension on a long bubble interface which is moving slowly and steadily in a capillary tube filled with a liquid of viscosity μ. The contact angle is taken as zero at the walls and the gravitational effect is neglected. This problem was originally considered by Bretherton and later studied numerically by Park (1990) and Ratulowski and Chang (1991). The main result we obtain is a formula of the film thickness in terms of M and Γ where M is the Marangoni number. A comparison with Bretherton's "clean" case shows the thickening effect of surfactant. This talk is partially based on an going work with Gelu Pasa.

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