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Effect of a surface tension imbalance on a partly submerged cylinder STOFFEL JANSSENS, VIKASH CHAURASIA, ELIOT FRIED, Okinawa Institute of Science and Technology Graduate University 1919-1 Tancha, Onna-son, Kunigami-gun, Okinawa, Japan 904-0495 — We perform a force analysis of a circular cylinder which lays between a liquid–gas interface and acts as a barrier between a surfactant-free surface and a surfactant-loaded surface. The respective surfaces have uniform surface tensions γ_a and γ_b which generate a surface tension imbalance $\Delta\gamma = \gamma_a - \gamma_b$, also referred to as surface pressure. In addition to the general force analysis, we determine the effect of $\Delta\gamma$ on the load-bearing capacity of a floating cylinder upon sinking for a specific set of parameters. Moreover, we demonstrate that $\Delta\gamma$ induces a horizontal force component which in magnitude is equal to $\Delta\gamma$, when measured per unit length cylinder, and use an energetic argument to prove that this relation applies to prismatic bodies in general.

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