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Failure loading on a thermocapillary nonwetting droplet[1] G. PAUL NEITZEL, PETER NAGY, Georgia Institute of Technology — Permanent nonwetting is a phenomenon characterized by a liquid droplet not wetting a surface with which it appears to be in contact. It is realized by generating relative tangential motion between the solid and droplet surfaces that drags a thin film of lubricating air (or any surrounding fluid) into the "contact" region, akin to the classical slider bearing. In the case of thermocapillary-induced nonwetting driven by a temperature difference between the solid and liquid, air films have been shown to be capable of sustaining substantial applied loads between droplet and surface. By exploiting the load-carrying capability of such nonwetting systems, several applications have been envisioned. For these devices to operate successfully, however, the lubricating film must be supplied continuously within the contact region. As expected, there are thresholds of load and/or vibration under which these films cannot be sustained. Experiments will be described that quantify failure-threshold loadings for both static and dynamic environments. These results will aid in designing reliable nonwetting systems exhibiting robust operation.

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