Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Boundary lubrication under pressure: could the friction jump down, instead of up? ANDREA VANOSSI, SISSA & CNR-IOM DEMOCRITOS, Trieste, Italy, ANDREA BENASSI, CNR-IENI, Milano, Italy, NICOLA VARINI, ICHEC, Dublin, Ireland, ERIO TOSATTI, SISSA & CNR-IOM DEMOCRITOS, ICTP, Trieste, Italy — The sliding friction during pressure squeezout of a boundary lubricated contact has been shown [1,2] to undergo upward jumps every time a lubricant atomic layer is expelled. Here we ask the question whether the jump could not be downward. Whereas most studies focus on the layered structure which the confined lubricant takes in the normal direction, the element we wish to consider is a possible change of parallel periodicity occurring at the squeezout transition. Such changes have been reported in simulations [3], but their effect has not been discussed so far. One possible effect could be a transition of the slider-lubricant interface commensurability, producing a switch of the frictional mechanism, from lubricant melting-freezing in a commensurate state, to superlubric in an incommensurate one – in this case with a drop of friction for increasing load. We exemplify this effect by MD simulations, where we replace for convenience the open squeezout system with a closed system, where the lubricant is sealed between the sliders. As the number of layers drops under pressure, the planar lubricant structural lattice parameter also drops. This change reflects in a sliding friction jump, which is easily observed to be downwards. The potential observability of load-induced friction drops will be discussed.

Andrea Vanossi
SISSA & CNR-IOM DEMOCRITOS, Trieste, Italy

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Date submitted: 15 Nov 2011 Electronic form version 1.4