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Published: 01/01/2004

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Link to publication

Citation for published version (APA):
The Lateral Force Apparatus (LFA)

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Introduction

Quantitative single asperity experiments can be used to study friction [1, 2] and wear [3]. For such measurements it is important to be able to independently measure friction and normal force [4], as well as indentation [1–4], in steady sliding over a large velocity range [2].

Description

The LFA is designed to achieve sliding velocities between 10 nm/s and 1 mm/s, and measure position with an accuracy of 1 nm. No explicit limitations to force range and tip size are defined; if the cantilever and tip can be produced, any force corresponding to a 20 μm deflection of the cantilever can be measured. Vertical motion (indentation) can be measured through a piezo.

Performance

The lowest achievable velocity was defined as the velocity that could be distinguished from stand still within a 2σ statistical error.

Conclusions

The LFA can be used to accurately quantify single-asperity tribology over a wide range of velocities, forces and length scales.

References: