Maximum Micro-Slip in Tangential Contact
of Randomly Rough Self-Affine Surfaces

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Many advanced laws of friction contain a characteristic length parameter defining the crossover from sticking to sliding [1]. The physical sense and the scaling properties of this length, however, could not yet be clarified. In the present work, we use the fact that any tangential contact of bodies with curved or rough surfaces naturally shows a preliminary slip at the micro scale even if the friction can be described locally by the simplest Coulomb law without preliminary micro-slip. In this work, we theoretically predict the value of the characteristic length of preliminary micro-slip and find closed form solutions for randomly rough fractal surfaces [2]. We simulate the slip region using advanced Boundary element techniques and confirm the analytical results. These new methods can be applied to arbitrary surface topographies.

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