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Relaxation of sliding friction from a statistical model of aging contacts

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Abstract: Friction governs processes ranging from the stability of seismic faults to the control of mechanical systems. After a sudden change in the sliding velocity, the frictional force relaxes to a new steady state [1]. This relaxation has conventionally been described as exponential within rate-and-state friction laws [2], which play a central role in determining whether steady fault slip remains stable or leads to earthquakes [3]. In this seminar, I introduce a microscopic model that incorporates aging of contact forces [4] and a power-law contact-length distribution reflecting the fractal roughness of the interface [5], both of which have been considered as the microscopic origin of this relaxation [6]. Analysis of the model reveals that the relaxation deviates qualitatively from the conventionally assumed exponential decay.

References

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