Abstract Submitted
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Theory of Lubrication Due to Collective Pinning[1] JEFFREY SOKOLOFF, Northeastern University — In collective pinning theory, the problem of two three dimensional solids in contact is at its critical dimension. This implies that when the disordered forces acting between the two solids at the interface are relatively strong, the force of static friction should be large, but at smaller values of these forces, the system switches over to a regime of weak static friction. This provides a mechanism for the reduction of friction in boundary lubrication. It was shown previously that small lubricant molecules reduce static friction by filling in atomic depth holes in the surface and thus allowing the force pushing the surfaces together to be supported by more points of contact, which can switch the interface from the strong to weak static friction regime. Here it will be shown that lubricant molecules which are large compared to atomic dimensions can also put the interface in the weak pinning limit because molecules attached to high points on the surfaces can be easily compressed, allowing the load to be spread over more points of contact, and hence putting the interface in the weak pinning regime.

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