

Abstract Submitted
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Elastohydrodynamics of wet bristles, carpets and brushes
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GOPINATH, Mechanical Engineering, MIT — We present an effective field theory
for the elastohydrodynamics of ordered brushes and disordered carpets. These soft
beds are comprised of elastic filamentous units, interspersed in a fluid and grafted
on a substrate. Our formulation leads naturally to a set of constitutive equations
coupling bed deformation to fluid flow, accounts for anisotropic properties of the
medium, and generalizes poroelasticity to these systems. These effective medium
equations are then used to study two canonical problems - the normal settling of a
rigid sphere onto a carpet, and the tangential shearing motion of a rigid sphere over
the carpet, both problems of much relevance in mechanosensation in biology.

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