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**Better Contact Through Twist? The skew-dependence of inter-filament adhesion** LUIS CAJAMARCA, GREGORY GRASON, University of Massachusetts Amherst — Adhesive interactions between flexible filaments maximizes their contact, though the geometry of optimal contact is far from obvious. We address a simple question: how does inter-filament twist vary the adhesive energy? We investigate two models for adhesive interactions for filaments: a Lennard-Jones potential (LJP), and a model consisting of opposite interactions, screened electrostatic repulsion and depletion attraction (SED). In both potentials the interaction energy decreases for large twist. However, for small twist the SED potential is metastable whereas the LJP is not. We understand this effect by looking at how distances between patches of area on the surface change with twist. Patches further away come into closer contact as twist increases, effectively increasing the repulsion energy. This in turn pushes the filaments away and the net result is to favor a locally parallel orientation. Finally, we predict how the geometric minima of the interaction energy varies with inter-filament spacing for the LJP, where we observe two regions dominated by geometry: threads regime, where the filaments are very thin and interactions are long-range, and contact regime, where the filaments are very thick tubes and interactions become short-range compared to tube diameter.

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