The ridge between two fracture tips

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ENRIQUE CERDA, Departamento de Fisica, Universidad de Santiago — The shape of a fracturing thin sheet is
governed by Griffith’s criterion, wherein both the system’s energy and the applied
force are minimized. For a thin sheet adhered to a substrate, the important ener-
gies are those of adhesion and bending of the sheet. Without adhesion, the ridge
connecting the crack tips need not be developable, and in-plane stretching energy
may become important. A reasonable assumption is that this ridge take the shape
of a minimal ridge. We present experimental and numerical results that show the
shape of this configuration does resemble the minimal ridge. However, an anomalous
energy scaling is observed. We also show that the ridge shape, and therefore energy
balance, depends on the length of the flap being pulled, which suggests a mechanism
for controlling crack shapes.

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