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Spiraling Cracks in Thin Sheets¹ VICTOR ROMERO²,
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de Santiago de Chile — A wide kind of everyday-life industrial products
come in a thin package that needs to be torn open by the user, and
the opening is not always easy. We built a simple setup to study crack
propagation in thin sheets coupled with large out-of-plane displacement
: A cylindrical tool is inserted in a straight incision in a thin sheet, and
is pushed against the sheet perpendicularly to that incision, eventually
propagating a crack. When the blunt tool is continually pushed against
the lip, we found that the crack follows a very robust spiraling path.
Experiments may be interpreted in terms of “Spira Mirabilis” (logarithmic
spiral). Starting with crack theory argument, we will show that the
early behavior of the cut path follows a portion of a logarithmic spiral,
and that the path tends to another spiral with a different pitch as the
crack adds more turns. Our crack experiment illustrates the fact that
thin sheets mechanics is deeply connected to geometry, and finally spirals
characteristics allow us to measure material crack properties of the
thin layer used.

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