

Abstract Submitted
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Spiraling Cracks in Thin Sheets¹ VICTOR ROMERO², BENOIT ROMAN, PMMH CNRS, ENRIQUE CERDA, Universidad 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.

¹SCAT project and the ALFA Programme of EuropeAid.

²Universidad de Santiago de Chile

Benoit Roman
PMMH CNRS

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