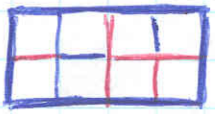
More map folding [Arkin, Bender, Demaine, Demaine, Mitchell, Sethia, Skiena 2003]

6.885
L20.1
Nov. 22, 2004

Recall from Lecture 6:

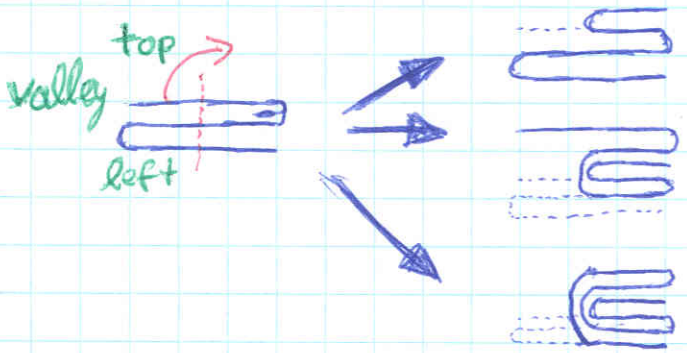


- given rectangular mxn grid of squares with mountain-valley assignment
- find a sequence of simple folds (each folding along one line by ±180°) that uses all creases (with proper orientation)
- every vertex has 3 mountains & 1 valley or 1 mountain & 3 valleys (by Maekawa)

⇒ all-mountain and all-valley lines in only one direction
⇒ 2D problem reduces to a sequence of 1D problems
- in 1D, mountain-valley pattern flat foldable
  ⇔ "mingling"
  ⇔ ∃ sequence of crimps & end folds

⇔ simply foldable...
in a particular model...

Models of simple folding



one layer

two layers (some layers)

three layers (all layers)

- some-layers simple fold = orientation of "top side"
  + externally visible crease (point) on top
  + #layers to fold (from top)
  + mountain or valley
- one-layer simple fold = just one layer
- all-layers simple fold = all layers at that point