RIGOROUS PROOF OF FLAT FOLDABLITY THEOREM OF ONE-DIMENSIONAL ORIGAMI

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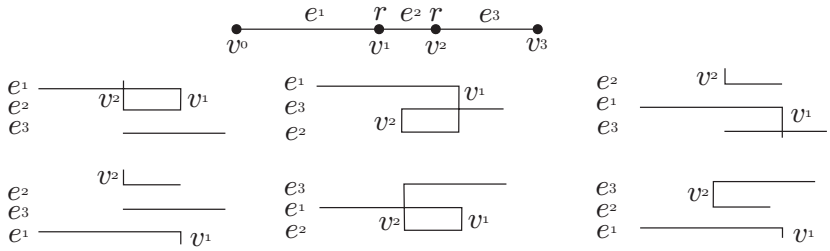
A one-dimensional (1D) origami is a closed interval $[v_0, v_n]$ with nodes $v_0 < v_1 < \cdots < v_{n-1} < v_n$. Any 1D origami is assumed to be oriented from v_0 to v_n. We denote by e_i the edge (v_{i-1}, v_i). When "mountain=right" ("valley=left") is given to a node v_i, the 1D origami is folded right (left) with double right angle at v_i.

An interesting theorem on flat foldability of 1D origami is given in [1], which says "Any flat foldable 1D origami can be folded by local operations (crimps and end folds)". Although the assertion is correct, its proof seems to rely on intuitive understanding. The aim of this talk is to give a definition of flat foldable 1D origami and a rigorous proof of the theorem above. We also deal with closed 1D origamis.

For example, the 1D origami top in the figure below is not flat foldable, and the lower 6 figures indicate how we should define flat foldability.



[1] E. D. Demaine and J. O'Rourke, Geometric Folding Algorithms, Cambrige University Press, (2007).

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