1154-05-2388 **Alvin Chiu*** (88alvinchiu88@gmail.com), **William Hoganson** (whogans1@swarthmore.edu), **Thomas C. Hull** (thull@wne.edu) and **Sylvia Wu** (sylviaw@g.clemson.edu). *Counting locally-flat-foldable origami configurations via 3-coloring graphs.*

One fundamental, and generally open, question in the mathematics of origami (paper folding) is counting the number of ways that a given crease pattern can be folded flat (i.e., can be pressed in a book without crumpling). Each way a crease pattern can be folded results in a mountain-valley (MV) assignment, denoting which creases bend convexly (mountains) or concavely (valleys) when looking at one side of the paper. Currently, this problem is only known in general for single-vertex crease patterns, which have been thoroughly studied and understood. We built off that understanding to create a new method counting MV assignments of a given crease pattern C that are locally valid (where each vertex folds flat, but globally there could still be self-intersection problems). That is, we find a graph C^*, called a SAW graph of C, whose proper 3-vertex colorings (with one vertex pre-colored) are in one-to-one correspondence with the locally-valid MV assignments of C. Our results show that SAW graphs can be made by tiling SAW graphs of flat-foldable vertices, and begin generating a library of SAW graphs for wide range of single vertices. This provides significant evidence that the combinatorial structure underlying locally-valid MV assignments is that of 3-coloring graphs. (Received September 17, 2019)