1 Logistics

Next meeting: Tuesday April 16, 11:30 - 1pm

Expectations for next meeting:

- **[Final poster]** Create draft of poster, using the template here: `https://sites.lsa.umich.edu/logm/resources/` (final poster due **Thursday, April 18**!)

  Send me a copy by **Monday evening**, so I have time to look over it before our meeting Tuesday.

- 3-fold distance formula

  In a hexagon suppose we choose fold angles $\theta_1, \theta_2, \theta_3$, and let $\alpha_{4,6}$ denote the angle between crease vector 4 and 6 (where $0 \le \alpha_{4,6} \le \pi$). Then

$$\begin{aligned}\cos(\alpha_{4,6}) = \frac{1}{16}(1 &- 3\cos\theta_1 - 3\cos\theta_2 - 3\cos\theta_3 - 3\cos\theta_1\cos\theta_2 \\ &- 3\cos\theta_2\cos\theta_3 + 9\cos\theta_1\cos\theta_3 - 3\cos\theta_1\cos\theta_2\cos\theta_3 \\ &+ 6\sin\theta_1\sin\theta_2 + 6\sin\theta_2\sin\theta_3 + 6\cos\theta_1\sin\theta_2\sin\theta_3 \\ &+ 6\sin\theta_1\sin\theta_2\cos\theta_3 + 12\sin\theta_1\cos\theta_2\sin\theta_3) \qquad (1)\end{aligned}$$

  Problem 12:

  (a) What is the 2nd-order approximation of (1) when fold angles θ_i are small?

  (b) The answer to (a) is a constant plus a quadratic form in $\theta_1, \theta_2, \theta_3$. What is the signature of this quadratic form?

  (c) If we impose the constraint

  $$\cos(\alpha_{4,6}) = -\frac{1}{2} + \epsilon$$

  for small $\epsilon > 0$, then using the approximation (a) what is the minimum possible value of

  $$E(\theta_1, \theta_2, \theta_3) = \theta_1^2 + \theta_2^2 + \theta_3^2$$

  as a function of ϵ?

- **[Writing]** Write up notes for this meeting, and continue writing up relevant discussion from this week in draft of final report

2 Energy propagation

Using our understanding of a single hexagon we would like to know how energy "propagates" in a hexagon lattice. We can reduce this to the following concrete question

Problem 13. In a single hexagon, suppose we fix fold angle 6 at some nonzero value $\theta_0 > 0$. The rest of the hexagon cannot lie completely flat. We would like to quantify this as follows: can we find some constant C such that

$$\max\{\theta_1, \theta_2, \dots, \theta_5\} \ge C\theta_0$$

for any fold configuration?