Harrison Chapman

Publication List

1. Markov chain sampling of random knot diagrams. In preparation.
   with A. Rechnitzer.
   We demonstrate a Markov Chain Monte Carlo sampler on the space of knot shadows and prove that it is ergodic. This provides a new way to uniformly sample knot diagrams and computationally enumerate the class of knot diagrams.

2. Slipknotting in knot diagrams. In preparation.
   I apply pattern theorem results to knot diagrams to show that slipknots of any topological type appear almost surely in different classes of knot diagrams. Namely, I show that diagrams of unknots contain slipknots, a result which remains a conjecture for other models of knotting.

3. Asymptotic laws for random knot diagrams. *Submitted* 2016.
   Preprint: `arXiv:1608.02638`.
   I show a pattern theorem result for knot diagrams and use it to both prove the Frisch-Wasserman-Delbrück conjecture for the model of knot diagrams and show that symmetries of knot diagrams are statistically insignificant.

4. Knot probabilities in random diagrams.
   with J. Cantarella, M. Mastin.
   J. Phys. A: Math. Theor. 49 (2016), no. 40, p. 405001.
   DOI: `10.1088/1751-8113/49/40/405001`.
   Preprint: `arXiv:1512.05749`.
   We compute the exact probability that a random diagram of n crossings has a given knot type (for $n \leq 10$) by directly enumerating and classifying the knot diagrams of n crossings. Our enumeration method is based on identifying knot diagrams with a class of embedded 4-regular planar graphs.

5. A Group-theoretic Approach to Human Solving Strategies in Sudoku.
   with M. Rupert (Mentor: E. Arnold).
   Colonial Academic Alliance Undergraduate Research Journal (2012) vol 3, article 3.
   Paper produced during an NSF REU at James Madison University in 2010. We quantify the data of Sudoku board states by considering which numbers cannot *go in a given cell and consider how a typical player's solving strategies are a group acting on this set of states.*

6. On orbital varieties of type A.
   Advisor: T. Pietraho. Honors thesis (2011). Bowdoin College.
   Thesis on the Smith conjecture on orbital varieties of nilpotent orbits in the Lie group GL_n. Outlines the correspondence between Young tableaux and orbital varieties and concludes with conditions for which certain shapes of Young tableaux will admit orbital varities which are not Smith.

Last updated: October 26, 2016

`http://hchapman.github.io/static/Pubs.pdf`