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Recent generalizations and applications of domino shuffling

Domino shuffling is a random map on the set of domino tilings of the square lattice. It is quite elementary to describe, and has good combinatorial properties; domino shuffling often behaves much like a bijection for enumerative purposes. It was introduced in 1992 by Elkies, Kuperberg, Larsen and Propp for counting domino tilings of Aztec Diamonds.

Since 1992, there have been quite a few generalizations, analyses, and applications of domino shuffling. This work is due to many people, including Borodin, Borodin-Gorin, Dimofte-Gukov, Nordenstam, Petersen-Speyer, Propp, Y., Y.-Cottrell, Y.-Liechty, Y.-Nordenstam, and others (the last two are works in progress). Much of this work has happened in the last two or three years; it spans many areas of mathematics and physics. I will try to give a sense of where the field stands today. I will also describe some of my contributions, including some new constructions of domino shuffles for different lattices, and an application to "box-counting" problems from algebraic geometry.