Asymptotics of dimers on tori and cylinders

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We study critical dimer systems on periodic lattices in the torus and the cylinder, focusing on non-bipartite lattices. The dimer characteristic polynomial determines a natural embedding of the lattice within the plane. We show that the dimer partition function is asymptotically the product of a term that is exponentially large in the area, a term that is exponentially large in the perimeter, and an explicit term that depends on the aspect ratio of the cylinder or torus (with respect to the natural embedding) as well as some parity-type information. Our calculations yield new information concerning the distribution of the number of loops winding around the torus or cylinder in the associated double-dimer models.

Joint work with Richard Kenyon and David Wilson.