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The point processes at turning points of large lozenge tilings

Abstract:

In the thermodynamic limit of the lozenge tiling model the frozen boundary develops special points where the liquid region meets with two different frozen regions. These are called turning points. It was conjectured by Okounkov and Reshetikhin that in the scaling limit of the model the local point process near turning points should converge to the GUE corners process. We will discuss various results showing that the point process at a turning point is the GUE corner process and that the GUE corner process is there in some form even when at the turning point the liquid region meets two frozen regions of arbitrary (non-lattice) rational slope. The last regime arises when weights in the model are periodic in one direction with arbitrary fixed finite period. The weights we study introduce a first order phase transition in the system. We compute the limiting correlation functions near this phase transition and obtain a process which is translation invariant in the vertical direction but not the horizontal.