Rhombic alternative tableaux, assemblees of permutations, and the ASEP

Olya Mandelshtam[*1] and Xavier Viennot[*2]

[1]Department of Mathematics, University of California, Berkeley, USA – United States
[2]Laboratoire Bordelais de Recherche en Informatique (LaBRI) – Université Bordeaux Segalen - Bordeaux 2, Université Sciences et Technologies - Bordeaux 1, École Nationale Supérieure d'Électronique, Informatique et Radiocommunications de Bordeaux (ENSEIRB), Centre National de la Recherche Scientifique : UMR5800 – Domaine Universitaire 351, cours de la Libération 33405 Talence Cedex, France

Abstract

In this paper, we introduce the rhombic alternative tableaux, whose weight generating functions provide
combinatorial formulae to compute the steady state probabilities of the two-species ASEP. In the ASEP, there are
two species of particles, one heavy and one light, on a one-dimensional finite lattice with open boundaries, and the
parameters a,b, and q describe the hopping probabilities. The rhombic alternative tableaux are enumerated by the Lah numbers, which also enumerate certain assembl'ees of permutations. We describe a bijection between the rhombic
alternative tableaux and these assemblees. We also provide an insertion algorithm that gives a weight generating
function for the assemb'ees. Combined, these results give a bijective proof for the weight generating function for the
rhombic alternative tableaux.

---

[*]Speaker