3 Nonlinear fluctuating hydrodynamics and a two species ASEP

(i) Check that the product measure is stationary for AHR model with $\alpha + \beta = 1$.

(ii) Calculate the matrix A at the origin for the $(\rho, 1)$ initial condition. Check that A is diagonalized by the matrix R.

(ii*) Calculate the susceptibility matrix C at the origin for the $(\rho, 1)$ initial condition. Check that $RC\,{}^tR$ is diagonal.

(ii**) Calculate the matrix H^α and G^α at the origin for the $(\rho, 1)$ initial condition.

(iii) Apply the Bethe ansatz for $n = 2, m = 1$ case.

(iv) Derive the multiple integral formula for $\mathbb{P}_{n,m}[N_+(t) = n, N_-(t) = m]$ for $(\rho, 1)$ initial condition from the formula for the transition probability.

(v*) Check that the multiple integral formula for $n = m, \alpha = \beta = 1/2, \rho = 1$ reduces to the one for the single species TASEP.