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Burgers equation in some matrix models

In works of Alice Guionnet—alone, and together with Ofer Zeitouni—have been established connections between limits of some matrix integrals (integrals of the form $I_N^\beta(A_N, B_N) = \int \exp\{\frac{N\beta}{2} \operatorname{tr}(U A_N U^* B_N)\} \, dm_N^\beta(U)$, where m_N^β denotes the Haar measure on the orthogonal group OA_N when $\beta = 1$ and on the unitary group $\mathcal{U}_N$ when $\beta = 2$, and A_N, B_N are diagonal real matrices), and the Burgers equation. Roughly speaking, the Burgers equation appears in connection to the rate function of the convergence of such integrals. In this talk we will show how these connections can be reinterpreted in terms of the Beltrami equation and we shall use this interpretation to give a more complete description of the rate function. We will apply this to a concrete example, related to the Ising model.

This is joint work with Alice Guionnet.