

Planar orthogonal polynomials using Riemann-Hilbert method

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Planar orthogonal polynomials in the double scaling limit have been much studied for their connection to Coulomb gas system in two dimensions. Most exact results have been known either for radially symmetric potential or for so-called Hele-Shaw potential, where the limiting density of the Coulomb gas is uniform over its support. When the potential is not Hele-Shaw type nor radially symmetric, we expect to observe a new type of singular behaviors. In this talk, we will propose a matrix Riemann-Hilbert problem for some polynomial potential that is not radially symmetric and not Hele-Shaw type. More explicitly we will consider the case when the Laplacian of the potential is $|z|^2$. This work is a preliminary report of the work by Abril Arenas and by Seong-Mi Seo.

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