A new approach for solving equilibrium problems in potential theory

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Time: Thursday 25.07., 10:30 - 11:00, Room SH 02

Abstract: We are interested in computing the unknown density of an equilibrium problem in logarithmic potential theory where the support of the equilibrium measure is a finite union of distinct intervals. Inspired by a Riemann-Hilbert approach, we reduce the problem to the solution of a system of singular integral equations with Cauchy kernels.

After briefly recalling the well-studied polynomial approach, we will be interested in considering rational approximations of the solutions, expressed in a basis of orthogonal rational functions with prescribed poles. This new approach ensures stable computations. These approximations satisfy some interpolatory conditions. Inspired by the third Zolotareff problem, the poles and the interpolation points are chosen in such a way that we can ensure small errors. We will also discuss a link with recent performant algorithms like the multipole method.

Finally, our new error estimates will be confirmed by numerical results. This is joint work with B. Beckermann.