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Potential theoretical aspects in constructive function theory

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Runge’s famous example, the interpolation of a function with 2 symmetric poles on the imaginary axis, shows that equidistant interpolation points on an interval are not in any case optimal for good approximations. In contrast, the equilibrium distribution as limiting distribution of the interpolation points yields optimal results. The lecture outlines the influence of the equilibrium distribution for constructive polynomial methods and their impact on the distribution of zeros of polynomials, including orthogonal polynomials. Moreover, it is shown that rational approximations may have a quite different behavior since the equilibrium distribution is disturbed by the poles of the approximations which are not fixed a priori.