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Computation of analytic capacity and the subadditivity problem

Analytic capacity measures the size of compact plane sets from the point of view of certain aspects of complex analysis. It was first introduced in the 1940's in connection with the so-called Painlevé problem of characterizing removable singularities of bounded holomorphic functions. Later, in the 1960's, it played a key role in the solution of fundamental problems in rational approximation. The last twenty years have seen significant advances in the understanding of analytic capacity, one of the most striking breakthroughs being the positive solution to the long-standing conjecture that analytic capacity is semi-additive (the capacity of the union of two sets is bounded by C times the sum of their individual capacities, where C is a universal constant). However, whether analytic capacity is subadditive (can we take C=1?) still remains an open problem.

The plan for the talk is (1) a brief history of analytic capacity and its applications, (2) a practical method for rigorous computation of analytic capacity, and (3) the hunt for a counterexample to the subadditivity problem. Parts (2) and (3) are based on joint work with Malik Younsi.