

Speaker: Erik Lundberg, Florida Atlantic University

Title: The classification problem for arclength null quadrature domains

Abstract: A planar domain is referred to as an arclength null quadrature domain if the integral with respect to the arclength of any analytic function (in the Smirnov space—the appropriate function space for integrating with respect to arclength) along the boundary vanishes. We use classical results (of Havinson-Tumarkin and Denjoy-Carleman-Ahlfors) in order to prove the existence of a roof function (a positive harmonic function whose gradient coincides with the inward-pointing normal along the boundary) for arclength null quadrature domains having finitely many boundary components. This bridges a gap toward the classification of arclength null quadrature domains by removing an a priori assumption from previous classification results. This result also strengthens a known connection between arclength null quadrature domains and a free boundary problem for Laplace's equation with an application in fluid dynamics that will be explained in the talk. We conclude by discussing the current status of the classification problem for arclength null quadrature domains.