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Cyclicity in the Dirichlet Space: a Constructive Approach

In this talk, I will consider functions that belong to the classical Dirichlet space, the space of analytic functions in the disk whose derivatives are square area integrable. In particular, I will examine the cyclic functions in this space, that is the functions whose polynomial multiples generate the whole space. I will give a brief survey of some well-known results relating cyclicity of a function to its boundary zero set, including the work of Brown and Shields as well as more recent progress made by El-Fallah, Kellay, and Ransford. I will then discuss an interesting question of how to construct, for some examples of cyclic functions f , the polynomials p such that pf approaches 1 in the Dirichlet norm, and examine questions of rate of "best approximation" in this context. This work is joint with Alberto Condori, Constance Liaw, Daniel Seco, and Alan Sola.