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Domains Without Dense Steklov Nodal Sets

This talk concerns the asymptotic geometric character of the nodal set of the eigenfunctions of the Steklov eigenvalue problem in two-dimensional domains. In particular results will be mentioned which establish the existence of a dense family $\mathcal{A}$ of simply-connected two-dimensional domains with analytic boundaries for each one of which the Steklov eigenfunction's nodal lines "are not dense at scale $1/j$". This result, which addresses a question put forth under "Open Problem 10" in Girouard and Polterovich, J. Spectr. Theory, 321-359 (2017), shows that, for domains in the class $\mathcal{A}$, the Steklov nodal sets have starkly different character than anticipated: they are not dense at any shrinking scale. A variety of numerical results, including surprising graphical manifestations of the non-dense nodal character, will also be presented. Work in collaboration with Jeffrey Galkowski.