Optimisation of a mixed Steklov Dirichlet Eigenvalue

Dr. Anisa Chorwadwala, IISER Pune

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In this talk, I am going to talk about an eigenvalue optimisation problem over a family of doubly connected domains $U := D \setminus \Omega$ in $\mathbb{R}^2$ where ∂D, one boundary component, is a circle while the other component, $\partial\Omega$, enjoys a dihedral symmetry. The Boundary Value Problem under consideration is $\Delta u = 0$ on $D \setminus \Omega$, $u = 0$ on ∂D and $\dfrac{\partial u}{\partial n} = \sigma u$ on $\partial\Omega$. We study the behaviour of the first nonzero eigenvalue of this problem as the domain Ω rotates about its own center by an angle θ in the anticlockwise direction. We also investigate if there is any symmetry, monotonicity in the behaviour of the eigenvalue as a function of θ, and try to find global maximisers and global minimisers of the eigenvalue with respect to θ. This is based on a joint work with Sagar Basak, Ravi Prakash and Sheela Verma.