

Variations on Pleijel's nodal theorem

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Courant's nodal theorem tells us that an eigenfunction of the Laplacian associated with eigenvalue number k has at most k nodal domains. Å. Pleijel showed in 1956 that for a given planar domain, with a Dirichlet boundary condition, equality can be reached only for a finite number of eigenvalues.

Pleijel's proof actually gives an asymptotic upper bound of the number of nodal domains. It has been extended afterwards to other geometric settings, boundary conditions and operators. The topic has received a lot of attention in the past decade and substantial progress has been made. Several generalizations and refined versions have been obtained, and a large number of special cases analyzed. I will describe these recent developments and the many open questions in this area. This will include joint work with K. Gittins.