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Nodal set estimates for perturbed rectangles

We will discuss properties of the nodal sets of low energy Dirichlet eigenfunctions in curvilinear rectangles. In the unperturbed case for a rectangle, the eigenfunctions of interest are the second, where the nodal set is a straight line, and the first eigenfunction with the nodal set containing a crossing, where the nodal set divides the rectangle into four nodal domains. We will describe which properties of the nodal sets and nodal domains are stable under perturbations of the rectangle, and provide quantitative estimates on the slope and curvature of the perturbed nodal sets. In particular, we will show that there is a criterion on how to perturb one side of the rectangle to open the nodal set, resulting in a reduction of the number of nodal domains, and give a sharp estimate on the size of the opening. This is joint work with Yaiza Canzani, Marichi Gupta, and Jeremy Marzuola.