

Mark S. Ashbaugh

Department of Mathematics
University of Missouri, Columbia, MO

A Sharp Lower Bound for the First Eigenvalue of the Vibrating Clamped Plate under Compression

Abstract:

We give a sharp lower bound to the fundamental frequency of a vibrating clamped plate under compression in the context of plates of different shapes of fixed area. Mathematically, the problem is that of bounding the first eigenvalue of a certain 4th-order partial differential operator with leading term the bi-Laplacian from below by a positive constant over the square of the domain's area. We give a Rayleigh-Faber-Krahn-type result for this problem for small compressions. Thus, our lower bound is saturated for a disk, and the constant appearing in our inequality is that for the disk under the appropriate compression. (This is joint work with R. Benguria and R. Mahadevan.)