

1057-35-429

L. Mercredi Chasman* (lchasman@knox.edu), Box K-67, Knox College, 2 East South Street, Galesburg, IL 61401. *An isoperimetric inequality for the free plate in all dimensions.*

We establish an isoperimetric inequality for the fundamental tone (first nonzero eigenvalue) of the free plate of a given area, proving the ball is maximal in all dimensions and for all positive values of the tension parameter τ . Given $\tau > 0$, the free plate eigenvalues ω and eigenfunctions u are determined by the equation $\Delta\Delta u - \tau\Delta u = \omega u$ together with certain natural boundary conditions. The boundary conditions are complicated but arise naturally from the plate Rayleigh quotient, which contains a Hessian squared term $|D^2u|^2$.

We adapt Weinberger's method from the corresponding free membrane problem, taking the fundamental modes of the unit ball as trial functions. These solutions are a linear combination of Bessel and modified Bessel functions. (Received January 26, 2010)