1036-35-25   **L. M. Chasman*** (`chasman@math.uiuc.edu`), Department of Mathematics, University of Illinois at Urbana-Champaign, 273 Altgeld Hall, 1409 W. Green Street, Urbana, IL 61801. *Isoperimetric problem for the free plate eigenvalue.* Preliminary report.

We aim to establish an isoperimetric inequality for the fundamental tone (first nonzero eigenvalue) of the free plate under which the unit ball is extremal.

The eigenvalue problem for the plate is given by $\Delta\Delta u - \tau \Delta u = \lambda u$ together with free boundary conditions. These boundary conditions are complicated but arise naturally from the Rayleigh quotient of the plate, which contains a Hessian squared term $|D^2 u|^2$.

We adapt Weinberger's method from the corresponding free membrane problem, taking the solutions for the unit ball as trial functions. These solutions are a linear combination of Bessel and modified Bessel functions. (Received November 25, 2007)

1