1051-35-164 **Bartłomiej Siudeja*** (`siudeja@illinois.edu`), University of Illinois at Urbana-Champaign.
Sharp bounds for eigenvalues of triangles.

Eigenvalues of the Laplacian on triangular domains cannot be computed exactly, in general. But the triangles that extremize the first eigenvalue (the fundamental tone of the membrane) often turn out to be equilateral, or degenerate in some way. These special triangles give sharp eigenvalue bounds for the general case.

Among all triangles with fixed diameter, we prove the degenerate acute isosceles triangle minimizes the Neumann fundamental tone. In the other direction, if we fix perimeter (or area) then the equilateral triangle maximizes the Neumann fundamental tone. Our approach involves variational principles and geometric transformations of the domain, and relies on the special (eigen)functions of equilateral triangles and circular sectors. (Received August 24, 2009)

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