1041-11-4 **Audrey A. Terras*** (aterras@ucsd.edu), Math. Dept., U.C.S.D., La Jolla, CA 92093-0112.

*Ihara zeta functions and quantum chaos.*

Quantum chaos and random matrix theory investigate the statistics of the spectra of various sorts of matrices and operators, as well as the zeros of zeta functions such as Riemann's zeta. We consider the Ihara zeta which is analog of the Riemann zeta associated to a finite connected graph. The Ihara zeta has been investigated by many people including Bass, Hashimoto, Kotani, and Sunada. It is the reciprocal of a polynomial. One wishes to understand the distribution of its poles. These poles are the reciprocals of the eigenvalues of a non-symmetric matrix of zeros and ones which Joel Friedman calls the non-backtracking adjacency matrix B. For a finite (q+1)-regular graph, the Riemann hypothesis for the poles of the Ihara zeta says that the non-trivial eigenvalues of the adjacency matrix A of the graph are contained within the spectrum of the adjacency operator on the universal covering tree of the finite graph; i.e., the graph is Ramanujan. We consider irregular graphs here for which the connection between the 2 adjacency matrices A and B is not so simple. Much of this work is joint with Harold Stark. More information on the subject can be found in a book draft on line: http://math.ucsd.edu/%7Eaterras/newbook.pdf. (Received June 16, 2008)