Electronic Journal of Linear Algebra ISSN 1081-3810
A publication of the International Linear Algebra Society
Volume 13, pp. 111-121, April 2005

ELA
www.math.technion.ac.il/iic/ela

APPROXIMATING THE ISOPERIMETRIC NUMBER OF STRONGLY REGULAR GRAPHS*

SIVARAMAKRISHNAN SIVASUBRAMANIAN†

Abstract. A factor 2 and a factor 3 approximation algorithm are given for the isoperimetric number of Strongly Regular Graphs. One approach involves eigenvalues of the combinatorial laplacian of such graphs. In this approach, both the upper and lower bounds involve the spectrum of the combinatorial laplacian. An interesting inequality is proven between the second smallest and the largest eigenvalue of combinatorial laplacian of strongly regular graphs. This yields a factor 3 approximation of the isoperimetric number. The second approach, firstly, finds properties of the metric which is returned by the linear programming formulation of [Linial et. al, The geometry of graphs and some of its algorithmic applications, Combinatorica, vol. 15(2) (1995), pp. 215–245] and secondly, gives an explicit cut which is within factor 2 of the optimal value of the linear program. The spectral algorithm can be generalized to get a factor 3 approximation for a variant of the isoperimetric number for Strongly Regular Graphs.

Key words. Strongly Regular graphs, Laplacian, Linear programming.

AMS subject classifications. 05C50, 15A42, 52B12.

* Received by the editors 19 February 2004. Accepted for publication 9 March 2005. Handling Editor: Bryan L. Shader.

†School of Technology and Computer Science, Tata Institute of Fundamental Research, Colaba, Mumbai 400 005, India (skrishna@tcs.tifr.res.in). Supported by a Kanwal Rekhi fellowship.