The Electronic Journal of Linear Algebra.
A publication of the International Linear Algebra Society.
Volume 6, pp. 2-10, October 1999.
ISSN 1081-3810. http://math.technion.ac.il/iic/ela

ELA

SPECTRA OF EXPANSION GRAPHS*

SHMUEL FRIEDLAND† AND HANS SCHNEIDER‡

Abstract. Replace certain edges of a directed graph by chains and consider the effect on the spectrum of the graph. It is shown that the spectral radius decreases monotonically with the expansion and that, for a strongly connected graph that is not a single cycle, the spectral radius decreases strictly monotonically with the expansion. A limiting formula is given for the spectral radius of the expanded graph when the lengths of some chains replacing the original edges tend to infinity. The proofs depend on the construction of auxiliary nonnegative matrices of the same size and with the same support as the original adjacency matrix.

Key words. Graph expansion, graph spectrum.

AMS subject classifications. Primary 05C50, 15A18, 15A45; Secondary 05C20, 05C38.

*Received by the editors on 28 March 1999. Accepted for publication on 1 September 1999. Handling Editor: Bryan L. Shader.

†Department of Mathematics, Statistics and Computer Science, University of Illinois at Chicago Chicago, IL 60680, USA (friedlan@uic.edu).

‡Department of Mathematics, University of Wisconsin, Madison, WI 53706, USA (hans@math.wisc.edu).