The Electronic Journal of Linear Algebra.
A publication of the International Linear Algebra Society.
Volume 3, pp. 48-74, April 1998.
ISSN 1081-3810. http://math.technion.ac.il/iic/ela

ELA

EXTREMIZING ALGEBRAIC CONNECTIVITY SUBJECT TO GRAPH THEORETIC CONSTRAINTS*

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Dedicated to Hans Schneider on the occasion of his seventieth birthday.

Abstract. The main problem of interest is to investigate how the algebraic connectivity of a weighted connected graph behaves when the graph is perturbed by removing one or more connected components at a fixed vertex and replacing this collection by a single connected component. This analysis leads to exhibiting the unique (up to isomorphism) trees on n vertices with specified diameter that maximize and minimize the algebraic connectivity over all such trees. When the radius of a graph is the specified constraint the unique minimizer of the algebraic connectivity over all such graphs is also determined. Analogous results are proved for unicyclic graphs with fixed girth. In particular, the unique minimizer and maximizer of the algebraic connectivity is given over all such graphs with girth 3.

AMS subject classifications. 05C50, 15A48

Key words. Weighted graphs, Laplacian matrix, algebraic connectivity, diameter, radius, girth

*Received by the editors on 20 November 1997. Accepted on 25 March 1998. Handling editor: Daniel Hershkowitz.

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