

EIGENVALUE CONDITIONS FOR INDUCED SUBGRAPHS

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Abstract

Necessary conditions for an undirected graph G to contain a graph H as induced subgraph involving the smallest ordinary or the largest normalized Laplacian eigenvalue of G are presented.

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REFERENCES

- [1] W.N. Anderson Jr. and T.D. Morley, *Eigenvalues of the Laplacian of a graph*, *Linear Multilinear Algebra* **18** (1985) 141–145.
doi:10.1080/03081088508817681
- [2] D.P. Bertsekas, *Nonlinear Programming: Second Edition* (Athena Scientific, Belmont, Massachusetts 1999) page 278, Proposition 3.1.1.
- [3] B. Bollobás and V. Nikiforov, *Graphs and Hermitian matrices: eigenvalue interlacing*, *Discrete Math.* **289** (2004) 119–127.
doi:10.1016/j.disc.2004.07.011
- [4] A.E. Brouwer and W.H. Haemers, *Spectra of Graphs* (Springer Verlag, 2011).

- [5] S. Butler, *Interlacing for weighted graphs using the normalized Laplacian*, Electron. J. Linear Algebra **16** (2007) 90–98.
- [6] F.R.K. Chung, *Laplacian of graphs and Cheeger's inequalities*, in: Combinatorics, Paul Erdős is Eighty, János Bolyai Math. Soc., Budapest Vol. 2, 1996, 157–172.
- [7] D.M. Cvetković, M. Doob and H. Sachs, *Spectra of Graphs: Theory and Applications* (Johann Abrosius Barth Verlag, Heidelberg-Leipzig, 1995).
- [8] R. Diestel, *Graph Theory* (Springer, Graduate Texts in Mathematics, 173, 2000).
- [9] W.H. Haemers, *Interlacing eigenvalues and graphs*, Linear Algebra Appl. **1995** (227–228) 593–616.
doi:10.1016/0024-3795(95)00199-2
- [10] F.J. Hall, *The Adjacency Matrix, Standard Laplacian, and Normalized Laplacian, and Some Eigenvalue Interlacing Results*, Department of Mathematics and Statistics Georgia State University Atlanta, GA 30303.
<http://www2.cs.cas.cz/seminem/lectures/2010-04-13-Hall.pdf>
- [11] J. Harant and S. Richter, *A new eigenvalue bound for independent sets*, Discrete Math. accepted.
http://www.tu-chemnitz.de/mathematik/preprint/2014/PREPRINT_08.pdf.
- [12] V.S. Shigehalli and V.M. Shettar, *Spectral techniques using normalized adjacency matrices for graph matching*, Int. J. Comput. Sci. Math. **2** (2011) 371–378.
- [13] Xiao-Dong Zhang, *The Laplacian eigenvalues of graphs: a survey*.
arXiv:1111.2897v1 [math.CO] 12Nov2011
- [14] R. Zurmühl, *Matrizen* (Springer 1950) 152–158.
doi:10.1007/978-3-642-53289-4_16

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