Discussiones Mathematicae
Graph Theory 36 (2016) 383–392
doi:10.7151/dmgt.1863

HEAVY SUBGRAPH CONDITIONS FOR LONGEST CYCLES TO BE HEAVY IN GRAPHS

Binlong Li[a,b,1] and Shenggui Zhang[a,2]

[a] *Department of Applied Mathematics*
Northwestern Polytechnical University
Xi'an, Shaanxi 710072, P.R. China

[b] *European Centre of Excellence NTIS*
306 14 Plzeň, Czech Republic

e-mail: libinlong@mail.nwpu.edu.cn
sgzhang@nwpu.edu.cn

Abstract

Let G be a graph on n vertices. A vertex of G with degree at least $n/2$ is called a heavy vertex, and a cycle of G which contains all the heavy vertices of G is called a heavy cycle. In this note, we characterize graphs which contain no heavy cycles. For a given graph H, we say that G is *H-heavy* if every induced subgraph of G isomorphic to H contains two nonadjacent vertices with degree sum at least n. We find all the connected graphs S such that a 2-connected graph G being S-heavy implies any longest cycle of G is a heavy cycle.

Keywords: heavy cycles, heavy subgraphs.

2010 Mathematics Subject Classification: 05C45, 05C07, 05C38.

References

[1] B. Bollobás and G. Brightwell, *Cycles through specified vertices*, Combinatorica **13** (1993) 147–155.
doi:10.1007/BF01303200

[2] J.A. Bondy and U.S.R. Murty, Graph Theory with Applications (Macmillan, London and Elsevier, New York, 1976).
doi:10.1007/978-1-349-03521-2

[1] Supported by the project NEXLIZ – CZ.1.07/2.3.00/30.0038.
[2] Supported by the NSFC (11271300). Corresponding author.

[3] G. Fan, *New sufficient conditions for cycles in graphs*, J. Combin. Theory Ser. B **37** (1984) 221–227.
doi:10.1016/0095-8956(84)90054-6

[4] R. Shi, 2-*neighborhoods and hamiltonian conditions*, J. Graph Theory **16** (1992) 267–271.
doi:10.1002/jgt.3190160310

Received 18 February 2015
Revised 13 July 2015
Accepted 13 July 2015