

On graphs with the smallest eigenvalue at least $-1 - \sqrt{2}$, part III

Sho Kubota *

*Tohoku University, Graduate School of Information Sciences,
6-3-09 Aoba, Aramaki-aza Aoba-ku, Sendai, Miyagi, Japan*

Tetsuji Taniguchi †

*Hiroshima Institute of Technology, Department of Electronics and Computer Engineering,
2-1-1 Miyake, Saeki-ku, Hiroshima, Japan*

Kiyoto Yoshino

*Tohoku University, Graduate School of Information Sciences,
6-3-09 Aoba, Aramamaki-aza, Aoba-ku, Sendai, Miyagi, Japan*

Received 15 January 2018, accepted 13 September 2019, published online 3 December 2019

Abstract

There are many results on graphs with the smallest eigenvalue at least -2 . In order to study graphs with the eigenvalues at least $-1 - \sqrt{2}$, R. Woo and A. Neumaier introduced Hoffman graphs and \mathcal{H} -line graphs. They proved that a graph with the sufficiently large minimum degree and the smallest eigenvalue at least $-1 - \sqrt{2}$ is a slim $\{[h_2], [h_5], [h_7], [h_9]\}$ -line graph. After that, T. Taniguchi researched on slim $\{[h_2], [h_5]\}$ -line graphs. As an analogue, we reveal the condition under which a strict $\{[h_1], [h_4], [h_7]\}$ -cover of a slim $\{[h_7]\}$ -line graph is unique, and completely determine the minimal forbidden graphs for the slim $\{[h_7]\}$ -line graphs.

Keywords: Hoffman graph, line graph, smallest eigenvalue.

Math. Subj. Class.: 05C50, 05C75

*S. K. was supported by JSPS KAKENHI; grant number: 18J10656.

†T. T. was supported by JSPS KAKENHI; grant number: 16K05263.

E-mail addresses: kubota@ims.is.tohoku.ac.jp (Sho Kubota), t.taniguchi.t3@cc.it-hiroshima.ac.jp (Tetsuji Taniguchi), kiyoto.yosino.r2@dc.tohoku.ac.jp (Kiyoto Yoshino)

O grafih, katerih najmanjša lastna vrednost je vsaj $-1 - \sqrt{2}$, III. del

Sho Kubota *

*Tohoku University, Graduate School of Information Sciences,
6-3-09 Aoba, Aramaki-aza Aoba-ku, Sendai, Miyagi, Japan*

Tetsuji Taniguchi †

*Hiroshima Institute of Technology, Department of Electronics and Computer Engineering,
2-1-1 Miyake, Saeki-ku, Hiroshima, Japan*

Kiyoto Yoshino

*Tohoku University, Graduate School of Information Sciences,
6-3-09 Aoba, Aramaki-aza, Aoba-ku, Sendai, Miyagi, Japan*

Prejeto 15. januarja 2018, sprejeto 13. septembra 2019, objavljeno na spletu 3. decembra 2019

Povzetek

Obstajajo številni rezultati o grafih, katerih najmanjša lastna vrednost je vsaj -2 . Kot orodje za raziskavo grafov, katerih lastne vrednosti so vsaj $-1 - \sqrt{2}$, sta R. Woo in A. Neumaier vpeljala Hoffmanove grafe in \mathcal{H} -povezavne grafe. Dokazala sta, da je graf, ki ima dovolj veliko najmanjšo stopnjo in katerega najmanjša lastna vrednost je vsaj $-1 - \sqrt{2}$, tanek $\{[h_2], [h_5], [h_7], [h_9]\}$ -povezavni graf. Po tem je T. Taniguchi raziskoval tanke $\{[h_2], [h_5]\}$ -povezavne grafe. Po analogiji v tem članku razkrivamo pogoje, pod katerimi je strogi $\{[h_1], [h_4], [h_7]\}$ -krov tankega $\{[h_7]\}$ -povezavnega grafa en sam, in popolnoma določimo minimalne prepovedane grafe za tanke $\{[h_7]\}$ -povezavne grafe.

Ključne besede: Hoffmanov graf, povezavni graf, najmanjša lastna vrednost.

Math. Subj. Class.: 05C50, 05C75

*S. K. je bil podprt s strani JSPS KAKENHI; številka dotacije: 18J10656.

†T. T. je bil podprt s strani JSPS KAKENHI; številka dotacije: 16K05263.

E-poštni naslovi: kubota@ims.is.tohoku.ac.jp (Sho Kubota), t.taniguchi.t3@cc.it-hiroshima.ac.jp (Tetsuji Taniguchi), kiyoto.yosino.r2@dc.tohoku.ac.jp (Kiyoto Yoshino)