

On few-class Q -polynomial association schemes: feasible parameters and nonexistence results

Alexander L. Gavriluk * 

*Center for Math Research and Education, Pusan National University,
2, Busandaehak-ro 63beon-gil, Geumjeong-gu, Busan, 46241, Republic of Korea*

Janoš Vidali † 

*Faculty of Mathematics and Physics, University of Ljubljana,
Jadranska ulica 21, 1000 Ljubljana, Slovenia, and
Institute of Mathematics, Physics and Mechanics,
Jadranska ulica 19, 1000 Ljubljana, Slovenia*

Jason S. Williford ‡ 

*Department of Mathematics and Statistics, University of Wyoming,
1000 E. University Ave., Laramie, WY 82071, United States of America*

Received 28 August 2019, accepted 28 August 2020, published online 19 August 2021

Abstract

We present the tables of feasible parameters of primitive 3-class Q -polynomial association schemes and 4- and 5-class Q -bipartite association schemes (on up to 2800, 10000, and 50000 vertices, respectively), accompanied by a number of nonexistence results for such schemes obtained by analysing triple intersection numbers of putative open cases.

Keywords: Association scheme, Q -polynomial, feasible parameters, distance-regular graph.

Math. Subj. Class. (2020): 05E30

*The author is supported by BK21plus Center for Math Research and Education at Pusan National University, by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (grant number NRF-2018R1D1A1B07047427) and by the Slovenian Research Agency (Slovenia-Russia bilateral grant number BI-RU/19-20-007).

†The author is supported by the Slovenian Research Agency (research program P1-0285, research projects J1-8130, J1-1691, J1-1692 and Slovenia-Russia bilateral grant (number BI-RU/19-20-007)).

‡The author was supported by National Science Foundation (NSF) grant DMS-1400281.

E-mail addresses: gavriluk@riko.shimane-u.ac.jp (Alexander L. Gavriluk), janos.vidali@fmf.uni-lj.si (Janoš Vidali), jwillif1@uwoyo.edu (Jason S. Williford)

O Q -polinomskih asociativnih shemah z malo razredi: dopustni parametri in rezultati o neobstoju

Alexander L. Gavriljuk * 

*Center for Math Research and Education, Pusan National University,
2, Busandaehak-ro 63beon-gil, Geumjeong-gu, Busan, 46241, Republic of Korea*

Janoš Vidali † 

*Faculty of Mathematics and Physics, University of Ljubljana,
Jadranska ulica 21, 1000 Ljubljana, Slovenia, and
Institute of Mathematics, Physics and Mechanics,
Jadranska ulica 19, 1000 Ljubljana, Slovenia*

Jason S. Williford ‡ 

*Department of Mathematics and Statistics, University of Wyoming,
1000 E. University Ave., Laramie, WY 82071, United States of America*

Prejeto 28. avgusta 2019, sprejeto 28. avgusta 2020, objavljeno na spletu 19. avgusta 2021

Povzetek

Predstavimo tabele dopustnih parametrov primitivnih Q -polinomskih asociativnih shem s tremi razredi ter Q -dvodelnih asociativnih shem s 4 in 5 razredi (ki imajo, po vrsti, do 2800, 10000 oz. 50000 vozlišč). Te tabele spremljajo številni rezultati o neobstoju takšnih shem, ki so dobljeni z analiziranjem trikratnih presečnih števil na splošno sprejetih odprtih primerih.

*Ključne besede: Asociativna shema, Q -polinomski, dopustni parametri, razdaljno regularni graf.
Math. Subj. Class. (2020): 05E30*

*Ta avtor je podprt s strani 'BK21plus Center for Math Research and Education' na Pusanski nacionalni univerzi, s strani 'Basic Science Research Program' preko 'National Research Foundation of Korea' (NRF), financiranega od 'Ministry of Education' (dotacija številka NRF-2018R1D1A1B07047427), in s strani Javne agencije za raziskovalno dejavnost Republike Slovenije (slovensko-ruska bilateralna nepovratna sredstva št. BI-RU/19-20-007).

†Avtor je podprt s strani Javne agencije za raziskovalno dejavnost Republike Slovenije (raziskovalni program P1-0285, raziskovalni projekti J1-8130, J1-1691, J1-1692 in slovensko-ruska bilateralna nepovratna sredstva (št. BI-RU/19-20-007)).

‡Avtor je bil podprt s strani 'National Science Foundation' (NSF), nepovratna sredstva DMS-1400281.
E-poštni naslovi: gavriljuk@riko.shimane-u.ac.jp (Alexander L. Gavriljuk), janos.vidali@fmf.uni-lj.si (Janoš Vidali), jwillif1@uwyo.edu (Jason S. Williford)