ISSN 1855-3966 (printed edn.), ISSN 1855-3974 (electronic edn.)
ARS MATHEMATICA CONTEMPORANEA 19 (2020) 249–275
https://doi.org/10.26493/1855-3974.2128.ccf
(Also available at http://amc-journal.eu)

Building maximal green sequences via component preserving mutations*

Eric Bucher

Department of Mathematics, Xavier University, Cincinnati, OH 45207, U.S.A.

John Machacek

Department of Mathematics and Statistics, York University, Toronto, Ontario M3J 1P3, Canada

Evan Runburg, Abe Yeck, Ethan Zewde

Department of Mathematics, Michigan State University, East Lansing, MI 48824, U.S.A.

Received 27 September 2019, accepted 16 July 2020, published online 16 November 2020

Abstract

We introduce a new method for producing both maximal green and reddening sequences of quivers. The method, called component preserving mutations, generalizes the notion of direct sums of quivers and can be used as a tool to both recover known reddening sequences as well as find reddening sequences that were previously unknown. We use the method to produce and recover maximal green sequences for many bipartite recurrent quivers that show up in the study of periodicity of T-systems and Y-systems. Additionally, we show how our method relates to the dominance phenomenon recently considered by Reading. Given a maximal green sequence produced by our method, this relation to dominance gives a maximal green sequence for infinitely many other quivers. Other applications of this new methodology are explored including computing of quantum dilogarithm identities and determining minimal length maximal green sequences.

Keywords: Cluster algebra, maximal green sequence, direct sum.

Math. Subj. Class. (2020): 13F60

*The authors would like to thank the anonymous referees for this paper. Their insightful feedback has helped strengthen the paper.

E-mail addresses: buchere1@xavier.edu (Eric Bucher), machacek@yorku.ca (John Machacek), runburge@msu.edu (Evan Runburg), yeckmarc@msu.edu (Abe Yeck), zewdeeth@msu.edu (Ethan Zewde)

ISSN 1855-3966 (tiskana izd.), ISSN 1855-3974 (elektronska izd.)
ARS MATHEMATICA CONTEMPORANEA 19 (2020) 249–275
https://doi.org/10.26493/1855-3974.2128.ccf
(Dostopno tudi na http://amc-journal.eu)

Konstrukcija maksimalnih zelenih zaporedij mutacij, ki ohranjajo komponente*

Eric Bucher

Department of Mathematics, Xavier University, Cincinnati, OH 45207, U.S.A.

John Machacek

Department of Mathematics and Statistics, York University, Toronto, Ontario M3J 1P3, Canada

Evan Runburg, Abe Yeck, Ethan Zewde

Department of Mathematics, Michigan State University, East Lansing, MI 48824, U.S.A.

Prejeto 27. septembra 2019, sprejeto 16. julija 2020, objavljeno na spletu 16. novembra 2020

Povzetek

Vpeljemo novo metodo, ki daje tako maksimalna zelena, kakor tudi rdečeča zaporedja v tulcih. Ta metoda, ki se imenuje "mutacije, ki ohranjajo komponente", je posplošitev ideje direktne vsote tulcev. Uporabimo jo lahko kot orodje za rekonstrukcijo znanih in za iskanje še neznanih rdečečih zaporedij. Metodo uporabimo za rekonstrukcijo maksimalnih zelenih zaporedij pri številnih dvodelnih ponavljajočih tulcih, ki jih dobimo pri študiju periodičnosti T-sistemov in S-sistemov. Poleg tega pokažemo, da je naša metoda povezana s pojavom dominance, ki ga je pred kratkim obravnaval Reading. Za poljubno maksimalno zeleno zaporedje, ki ga daje naša metoda, zveza z dominanco daje kakšno maksimalno zeleno zaporedje za neskončno mnogo drugih tulcev. Uporabe te nove metode, ki jih obravnavamo, vsebujejo računanje kvantnih dilogaritemskih indentitet in določanje maksimalnih zelenih zaporedij minimalne dolžine.

Ključne besede: Klasterska algebra, maksimalno zeleno zaporedje, direktna vsota.

Math. Subj. Class. (2020): 13F60

*Avtorji se zahvaljujejo anonimnim recenzentom za pronicljive povratne informacije, ki so pomagale okrepiti ta prispevek.

E-poštni naslovi: buchere1@xavier.edu (Eric Bucher), machacek@yorku.ca (John Machacek), runburge@msu.edu (Evan Runburg), yeckmarc@msu.edu (Abe Yeck), zewdeeth@msu.edu (Ethan Zewde)