

BUILDING A STEINER FLOW NETWORK OF 2nd RANK OF OPTIMALITY

M.A. BAGOV

Institute of Applied Mathematics and Automation –
branch of Kabardino-Balkarian Scientific Center of the Russian Academy of Sciences
360000, Russia, Nalchik, 89 A Shortanov street

Annotation. The existing methods for the synthesis of optimal streaming networks are tuned for the design of terminal networks. An additional gain in the cost and operation of networks for the planned period provides the connection of the synthesis problem of the terminal streaming network and the Steiner streaming network.

Keywords: Steiner streaming network, streaming network, cost reduction, dense base graph, computer design

REFERENCES

1. Kudaev V.Ch., Abazokov M.B. Computer design of stream networks of the P-rank of optimality. *Izvestiya Kabardino-Balkarskogo nauchnogo centra RAN* [News of the Kabardino-Balkarian Scientific Center of RAS]. 2019. No. 6 (92). Pp. 122–131. DOI: 10.35330 / 1991-6639-2019-6-92-122-131. (In Russian)
2. Bagov M.A., Kudaev V.Ch. Rank optimization of networks for the transfer of matter and energy. *III mezdunarodnaya konferentsiya po matematicheskому modelirovaniyu. Tezisy dokladov* [III international conference on mathematical modeling. Abstracts of reports]. 2017. Yakutsk: Severo-Vostochnyj federal'nyj universitet imeni M.K. Ammosova. P. 183. (In Russian)
3. Gilbert E.N., Pollak G.O. Steiner minimal trees. *Kiberneticheskiy sbornik* [Cybernetic collection]. New series. No. 8. Moscow: Mir, 1971. Pp. 19–49. (In Russian)
4. Gordeev E.N., Tarastsov O.G. Steiner's problem. Review. *Diskretnaya matematika* [Discrete Mathematics]. 1993. Vol. 5, No. 2. Pp. 3–28. (In Russian)
5. Melzak Z.A. On the problem of Steiner. *Canad. Math. Bull.* 1961. Vol. 4. Pp. 143–148.
6. Panyukov. A.V. Topological methods for solving the Steiner problem on a graph. *Avtomatika i telemekhanika* [Automation and telemechanics]. 2004. No. 3. Pp. 89–99. (In Russian)
7. Korte B., Promel H.-J., Steger A. Steiner trees in VLSI-layout. Rep. 89566-OR, Inst fur Okon. und Op. Res. Rheinische, Fr.-Wil.-Univ. Bonn, 1989.
8. Lotarev D.T. Steiner's problem for a transport network on a surface presented by a digital model. *Avtomatika i telemekhanika* [Automation and telemechanics]. 1980. Vol. 10. Pp. 104–115. (In Russian)
9. Gilbert E.N. Minimal Cost Communication Networks. *Bell System Technological Journal*. 1967. No. 9. Pp. 48–50.
10. Bagov M.A., Kudaev V.Ch. Local solution of the Steiner network problem. *Doklady Adygskoy (Cherkesskoy) Akademii nauk* [Reports of the Adyge (Circassian) Academy of Sciences]. 2014. Vol. 16. No. 4. Pp. 9–14. (In Russian)
11. Bagov M.A., Kudaev V.Ch. Transformation of the terminal network into the Steiner network. *Izvestiya Kabardino-Balkarskogo nauchnogo centra RAN* [News of the Kabardino-Balkarian Scientific Center of RAS]. 2015. No. 6 (68). Pp. 31–37. (In Russian)
12. Bagov M.A., Kudaev V.Ch. Mathematical modeling and optimization of the Steiner pipeline network. *Izvestiya Kabardino-Balkarskogo nauchnogo centra RAN* [News of the Kabardino-Balkarian Scientific Center of RAS]. 2017. No. 1 (75). Pp. 5–11. (In Russian)
13. Bagov M.A., Kudaev V.Ch. Steiner's network problem taking into account energy costs. *Vestnik KRAUNTS. Fiz.-mat. nauki* [Bulletin of Kamchatka Regional Association Scientific-Educational Center (KRASEC). Phys.-mat. Science]. 2016. No. 4-1 (16). Pp. 85–92. (In Russian)

14. Bagov M.A., Kudaev V.Ch. Construction of Steiner Streaming Network of the Second Optimality Rank. *Itogi nauki i tekhniki. Sovremennaya matematika i yeye prilozheniya. Tematicheskiye obzory* [Results of Science and Technics. Contemporary mathematics and its applications. Thematic reviews]. 2018. Vol. 154. Pp. 32–42. (In Russian)
15. Bagov M.A. Nonlocal solution of the Steiner network problem. *Vestnik KRAUNTS. Fiz.-mat. nauki* [Bulletin of Kamchatka Regional Association Scientific-Educational Center (KRASEC). Phys.-mat. Science]. 2018. No. 1 (12). Pp. 148–157. DOI: 10.18454 / 2079-6641-2018-24-4-148-157 (In Russian)
16. Abramov N.N. *Raschet vodoprovodnykh setey* [Calculation of water supply networks]. Moscow: Stroyizdat, 1983. 275 p. (In Russian)
17. Merenkov A.P., Sennova E.V., Sumarokov S.V. and other. *Matematicheskoye modelirovaniye i optimizatsiya sistem teplo-, vodo-, nefte- i gazosnabzheniya* [Mathematical modeling and optimization of heat, water, oil and gas supply systems]. Novosibirsk: Nauka, 1992. 407 p. (In Russian)
18. Bagov M.A., Skorikova L.V. Algorithm for constructing the base graph of the synthesis problem for an optimal streaming network. *Vestnik KRAUNTS. Fiz.-mat. nauki* [Bulletin of Kamchatka Regional Association Scientific-Educational Center (KRASEC). Phys.-mat. Science]. 2018. No. 4 (24). Pp. 158–165. (In Russian)
19. Kudaev V.Ch. Ranges of extrema and structural optimization of large network systems. *Izvestiya Kabardino-Balkarskogo nauchnogo centra RAN* [News of the Kabardino-Balkarian Scientific Center of RAS]. 2016. No. 4 (72). Pp. 15–24. (In Russian)

Information about the author

Bagov Marat Alievich, Researcher of the Department of Computational Methods, Institute of Applied Mathematics and Automation – branch of Kabardino-Balkarian Scientific Center of the Russian Academy of Sciences;
360000, Russia, Nalchik, 89 A Shortanov street;
maratniipma@mail.ru