

POYEZDLAR ORALIQ INTERVAL VAQTLARINI TARTIBDA
SOLISHDA ILG'OR TEXNOLOGIYALAR

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Annotatsiya. *Ishdan asosiy maqsad poyezdlar oraliq interval vaqtlarini tartibda ilg'or texnologiyalarni qo'llash orqali yuk va yo'lovchi tashish qobiliyatini oshirishdan iborat. Peregonlarda poyezdlar oraliq interval vaqtlarini tartibga solishda EMRTS tizimining texnologik jarayonlari o'rganildi. Natija peregonlarda poyezdlar o'tkazish qobiliyati mos ravishda 2÷4 juftga oshirish bo'yicha nazariy aniqlandi. Temir yo'l ekspluatatsiya ish ko'rsatkichlarining iqtisodiy baholash imkoniyati yaratildi.*

Kalit so'zlar: *Poyezd, peregon, interval, o'tkazish qobiliyati, texnologiya, temir yo'l uchastkasi, EMRTS, tezlik.*

ADVANCED TECHNOLOGIES FOR REGULATING TRAIN
HEADWAYS

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Abstract. *The main objective of this work is to increase freight and passenger transport capacity by applying advanced technologies to regulate train headways. The technological processes of the EMRTS system for regulating train headways on block sections were studied. The results theoretically determined that the train throughput capacity on block sections*

could be increased by 2-4 pairs, respectively. This creates an opportunity for the economic assessment of railway operational performance indicators.

Keywords: *Train, block section, headway, throughput capacity, technology, railway section, EMRTS, speed.*

KIRISH.

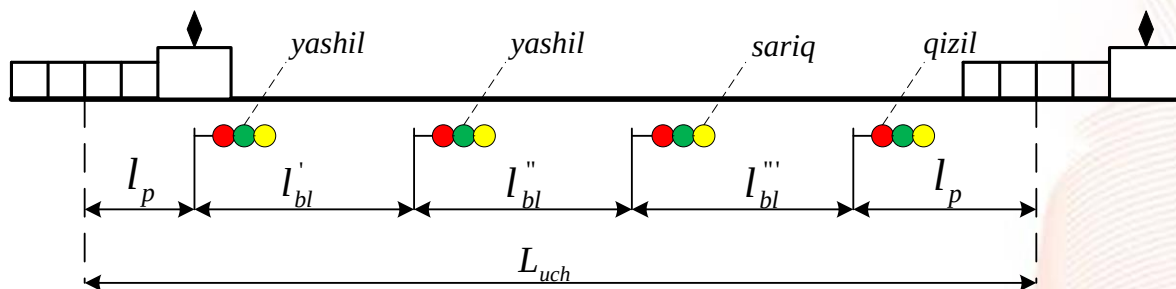
Temir yo‘l transportida yuk va yo‘lovchi tashishning texnologik jarayonlari poyezdlar harakati grafigida o‘rnatilgan texnik va texnologik me‘yorlari bo‘yicha amalaga oshiriladi [1, 2, 3]. Turli toifadagi poyezdlar harakatining o‘rnatilgan minimal oraliq interval vaqt me‘yorlari temir yo‘l uchastkalarida tashish qobiliyatini oshiradi [4, 5, 6]. Shuningdek, temir yo‘l uchastkalari tarkibidagi peregonlarda poyezdlar oraliq intervallarini tartibga solishning zamonaviy texnologiyalarini qo‘llash bo‘yicha tadqiqot olib borish muhim ahamiyat kasb etadi.

Hozirgi vaqtda temir yo‘l liniyalarining o‘tkazish va tashish qobiliyatini oshirishda poyezdlar oraliq intervalini nazorat qilish boshqaruv tizimlarining roli sezilarli darajada oshib bormoqda. Zamonaviy ilg‘or texnologiyalar interval boshqaruv tizimlari uchastkalar o‘tkazish qobiliyatini o‘rnatish, xavfsizlik talablarini belgilash va transport samaradorligini oshirish uchun kompleks yondashuvlarni talab qiladi.

ADABIYOTLAR TAHLILI.

Temir yo‘l uchastkalarida yuk poyezdlari oraliq intervallarini tartibga solish usullari turli yillarda turlicha ilmiy tadqiqot ishlari olib borilishiga qaramay dolzarb masala bo‘lib kelmoqda [1-9].

Avtomatik blokirovka bilan jihozlangan temir yo‘l uchastkalari tarkibidagi peregonlarda yuk poyezdlari oraliq intervallarini tartibga soluvchi sxematik ko‘rinishi 1-rasmda ko‘rsatilgan.



1-rasm. Poyezdlarni parallel jo‘natishda oraliq intervallarni tartibga soluvchi sxematik ko‘rinishi

Avtomatik blokirovka tizimi bo‘yicha poyezdlarni harakatini tashkil etishda yuk poyezdlari oraliq interval vaqt me‘yorlarini minimallashtirish imkoniyatini yaratadi. Uch belgili avtomatik blokirovka bilan jihozlangan temir yo‘l uchastkalarida yuk poyezdlar oraliq interval vaqti quyidagi ifoda orqali aniqlanadi [5]

$$I = 0,06 \cdot \frac{3 \cdot l_{bl} + l_p}{\vartheta_{yur}}, \text{ daqiqa} \quad (1)$$

bu kilometrlarni metrغا va soatlarni daqiqaga o‘zgartiruvchi yerda 0,06 – koeffitsiyenti;

l_{bl} – blok-uchastkalar uzunligi, m;

l_p – poyezd uzunligi, m;

ϑ_{yur} – temir yo‘l uchastkasi tarkibidagi peregonlarda yuk poyezdlarining yurish tezligi, km/soat.

Temir yo‘l yuchastka va yo‘nalishlari bo‘yicha yuk poyezdlari oraliq intervallarini tartibga solish orqali sutkalik yuk tashish qobiliyati quyidagi ifoda bo‘yicha aniqlanadi

$$\Gamma = Q N_{yuk}, \quad (2)$$

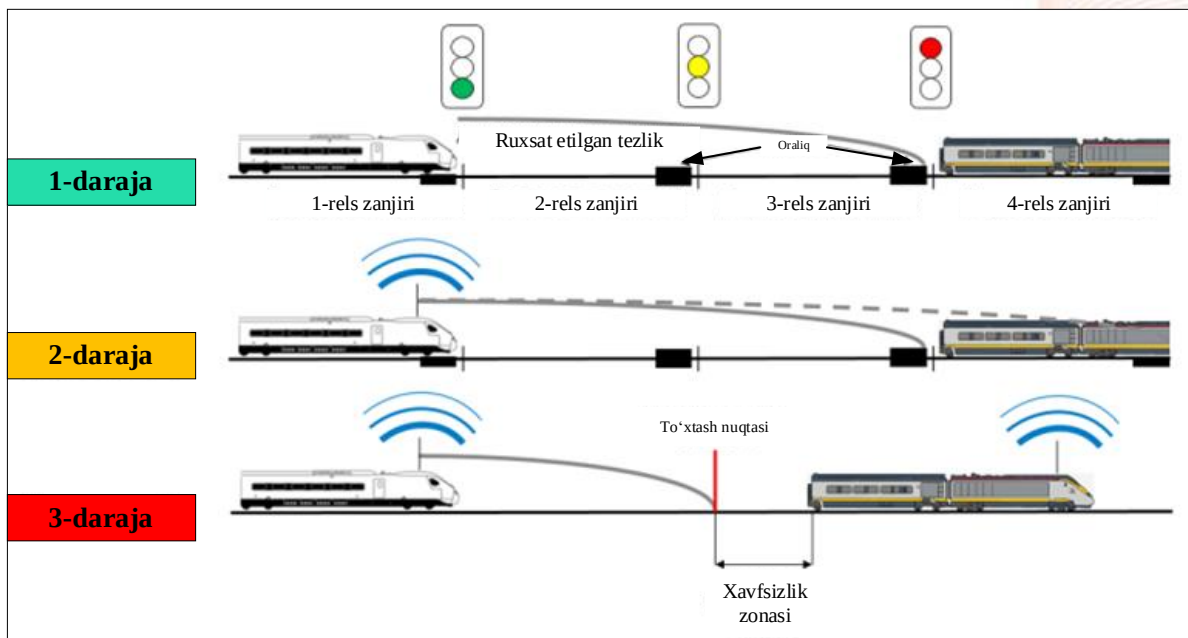
bu yuk poyezdining o‘rtacha netto og‘irligi;
yerda: Q –

N_{yuk} – Yuk poyezdlari o‘tkazish qobiliyati;

Yevropa temir yo‘l transportining boshqarish yagona tizimi (EMRTS - European rail traffic management system) - hozirgi vaqtda Yevropaning

umumiy foydalanishdagi temiryo‘l tarmoqlarida qo‘llaniladigan yagona tizim hisoblanadi [7].

Poyezdlarni peregonlarda ETCS tizimi bo‘yicha oraliq intervallarini tartibga solish darajalarini chegaralash 2-rasmda ko‘rsatilgan.



2-rasm. Poyezdlarni peregonlarda ETCS tizimi bo‘yicha oraliq intervallarini tartibga solish darajalarini chegaralash

Tahlil natijalariga ko‘ra poyezdlarni peregonlarda oraliq intervallarini tartibga solish ETCS texnologiyasi va uch belgili avtoblokirovka tizimi bilan taqqoslaganda 2÷3 tagacha poyezdlarni o‘tkazish imkoniyatini yaratadi. Demak zamonaviy ilg‘or texnologiyalarni qo‘llash orqali yuk va yo‘lovchi tashish ko‘rsatkichlarini oshirishning nazariy tomonlari o‘rganildi.

Xulosa.

Xulosa o‘rnida shuni ta’kidlash mumkinki, temir yo‘l uchastkalarida poyezdlar oraliq intervallarini tartibga solishda ERTCS tizimini qo‘llash quyidagi natijalarga olib keladi:

- temir yo‘l yo‘nalishlari va uchastkalarida yuk va yo‘lovchi tashish qobiliyatini oshirish;
- turli toifadagi poyezdlar harakat tezliklari ko‘rsatkichlarini amalda bajarilishini oshirish;

- vagon oqimlari va poyezdlar grafik vaqtlarini tezkor o'zgartirish orqali yuk tashish hajmini oshirish;
- temir yo'l ekspluatatsiya ish ko'rsatkichlari (tezliklar, vagonlar turish vaqti, vagon aylanmasi, yuklarni yetkazib berish muddati va h.k.)ning iqtisodiy baholash.

ADABIYOTLAR:

1. D. Canca, E. Barrena, E. Algaba, and A. Zarzob, "Design and analysis of demand-adapted railway timetables," *J. Adv. Transp.* **48**(2), 119–137 (2014). <https://doi.org/10.1002/atr.1261>.
2. D.-K. Kim and C.-H. Park, "Development of train scheduling model accommodating transfer behavior," *J. East. Asia Soc. Transp. Stud.*, 372–384 (2005). Available at <https://www.researchgate.net/publication/228635586>.
3. D. Butunov, S. Abdukodirov, Sh. Buriyev, and M. Akhmedova, "Development factor model of train movement graph indicators," *E3S Web Conf.* **531**, 02008, 1–10 (2024). <https://doi.org/10.1051/e3sconf/202453102008>.
4. D. Butunov, K. Mukhammadiev, S. Abdukodirov, Sh. Buriyev, and M. Toxtakxodjaeva, "Improving the standardization of wagon standby time at the sorting station," *E3S Web Conf.* **549**, 04003, 1–11 (2024). <https://doi.org/10.1051/e3sconf/202454904003>.
5. V. A. Olencevich, A. A. Olencevich, and V. E. Gozbenko, "Optimization of railway station operation on a railway line section under conditions of implementation of modern interval train control systems," *Sovrem. Tekhnol. Syst. Anal. Model.* **3**(71), 149–157 (2021). [https://doi.org/10.26731/1813-9108.2021.3\(71\).149-157](https://doi.org/10.26731/1813-9108.2021.3(71).149-157).
6. M. Bababeik, S. Zerguinib, M. Farjad-Amina, N. Khademia, and M. Bagherik, "Developing a train timetable according to track maintenance plans:

- A stochastic optimization of buffer time schedules,” *Transp. Res. Procedia*, 27–34 (2019). <https://doi.org/10.1016/j.trpro.2018.12.162>.
7. A. P. Baturin and A. P. Osipov, “Modern systems of train traffic interval control on world railways,” *World Transp. Transp.* **21**(2), 18–26 (2023). <https://doi.org/10.30932/1992-3252-2023-21-2-2>.
8. E. N. Rozenberg, A. V. Ozerov, V. I. Kuznetsov, and S. S. Tikhonov, “Comparison of train traffic parameters for various virtual coupling use cases,” *World Transp. Transp.* **21**(4), 30–39 (2023). <https://doi.org/10.30932/1992-3252-2023-21-4-4>.
9. B. Jaumard, “Freight train scheduling with minimum energy consumption,” *Railw. Eng. Des. Oper.*, 195–204 (2016). <https://doi.org/10.2495/TDI-V1-N3-501-510/020>.