

# JOURNAL OF TRANSPORT



ISSUE 4, 2025 vol. 2

E-ISSN: 2181-2438

ISSN: 3060-5164



RESEARCH, INNOVATION, RESULTS



**TOSHKENT DAVLAT  
TRANSPORT UNIVERSITETI**

Tashkent state  
transport university



**JOURNAL OF TRANSPORT**

RESEARCH, INNOVATION, RESULTS

**E-ISSN: 2181-2438**

**ISSN: 3060-5164**

**VOLUME 2, ISSUE 4**

**DECEMBER, 2025**



[jot.tstu.uz](http://jot.tstu.uz)

# TASHKENT STATE TRANSPORT UNIVERSITY

## JOURNAL OF TRANSPORT

SCIENTIFIC-TECHNICAL AND SCIENTIFIC INNOVATION JOURNAL

VOLUME 2, ISSUE 4 DECEMBER, 2025

**EDITOR-IN-CHIEF**

**SAID S. SHAUMAROV**

*Professor, Doctor of Sciences in Technics, Tashkent State Transport University*

**Deputy Chief Editor**

**Miraziz M. Talipov**

*Doctor of Philosophy in Technical Sciences, Tashkent State Transport University*

---

The “**Journal of Transport**” established by Tashkent State Transport University (TSTU), is a prestigious scientific-technical and innovation-focused publication aimed at disseminating cutting-edge research and applied studies in the field of transport and related disciplines. Located at Temiryo‘lchilar Street, 1, office 465, Tashkent, Uzbekistan (100167), the journal operates as a dynamic platform for both national and international academic and professional communities. Submissions and inquiries can be directed to the editorial office via email at [jot@tstu.uz](mailto:jot@tstu.uz).

The Journal of Transport showcases groundbreaking scientific and applied research conducted by transport-oriented universities, higher educational institutions, research centers, and institutes both within the Republic of Uzbekistan and globally. Recognized for its academic rigor, the journal is included in the prestigious list of scientific publications endorsed by the decree of the Presidium of the Higher Attestation Commission No. 353/3 dated April 6, 2024. This inclusion signifies its role as a vital repository for publishing primary scientific findings from doctoral dissertations, including Doctor of Philosophy (PhD) and Doctor of Science (DSc) candidates in the technical and economic sciences.

Published quarterly, the journal provides a broad spectrum of high-quality research articles across diverse areas, including but not limited to:

- Economics of Transport
- Transport Process Organization and Logistics
- Rolling Stock and Train Traction
- Research, Design, and Construction of Railways, Highways, and Airfields, including Technology
- Technosphere Safety
- Power Supply, Electric Rolling Stock, Automation and Telemechanics, Radio Engineering and Communications
- Technological Machinery and Equipment
- Geodesy and Geoinformatics
- Automotive Service
- Air Traffic Control and Aircraft Maintenance
- Traffic Organization
- Railway and Road Operations

The journal benefits from its official recognition under Certificate No. 1150 issued by the Information and Mass Communications Agency, functioning under the Administration of the President of the Republic of Uzbekistan. With its E-ISSN 2181-2438, ISSN 3060-5164 the publication upholds international standards of quality and accessibility.

Articles are published in Uzbek, Russian, and English, ensuring a wide-reaching audience and fostering cross-cultural academic exchange. As a beacon of academic excellence, the "Journal of Transport" continues to serve as a vital conduit for knowledge dissemination, collaboration, and innovation in the transport sector and related fields.

## Operating modes and control challenges of microgrids based on distributed generation

J.N. Tolipov<sup>1</sup><sup>a</sup>, A.H. Saidov<sup>2</sup><sup>b</sup>, S.Y. Makhamadjonov<sup>3</sup><sup>c</sup>

<sup>1</sup>Institute of Energy Problems of the Academy of Sciences of the Republic of Uzbekistan, Uzbekistan

<sup>2</sup>Tashkent University of Information Technologies named after Muhammad al-Khwarizmi, Uzbekistan

<sup>3</sup>Andijan state technical institute, Andijan, Uzbekistan

**Abstract:** This article analyzes the operating modes and control challenges of microgrids based on distributed generation. The grid-connected and islanded operating modes of microgrids are compared from technical, economic, and environmental perspectives. In the grid-connected mode, issues such as bidirectional power flow, coordination of protection systems, control of reverse power flow, and mitigation of harmonic distortions are examined. In the islanded mode, challenges related to low inertia reserves, maintaining frequency stability, requirements for energy storage systems, and coordination of local resources are discussed. According to the research results, developing effective control strategies for each operating mode is crucial for improving the reliability and efficiency of microgrids.

**Keywords:** distributed generation, operating modes, microgrid, static switch, islanded mode, grid-connected mode, power flow, frequency stability, energy efficiency

## Taqsimlangan generatsiya asosidagi mikrogridlarning ishlash rejimlari va boshqaruv muammolari

Tolipov J.N.<sup>1</sup><sup>a</sup>, Murtazov Sh.I.<sup>2</sup><sup>b</sup>, Mahamadjonov S.Y.<sup>3</sup><sup>c</sup>

<sup>1</sup>O'zbekiston Respublikasi Fanlar akademiyasi Energetika muammolari instituti, O'zbekiston

<sup>2</sup>Muhammad al-Xorazmiy nomidagi Toshkent axborot texnologiyalari universiteti, O'zbekiston

<sup>3</sup>Andijon davlat texnika instituti, Andijon, O'zbekiston

**Annotatsiya:** Ushbu maqolada taqsimlangan generatsiya asosidagi mikrogridlarning ishlash rejimlari va boshqaruv muammolari tahlil qilingan. Mikrogridlarning tarmoqqa ulangan (grid-connected) va avtonom (islanded) rejimlari texnik, iqtisodiy va ekologik jihatdan solishtirilgan. Tarmoqqa ulangan rejimda quvvat oqimining ikki yo'nalishli bo'lishi, himoya tizimlari koordinatsiyasi, teskari quvvat oqimini boshqarish va garmonik buzilishlarni kamaytirish masalalari ko'rib chiqilgan. Avtonom ish rejimida esa inertsia zaxirasining kichikligi, chastota barqarorligini ta'minlash, energiya saqlash tizimlari talablari va mahalliy resurslarni muvofiqlashtirish muammolari yoritilgan. Tadqiqot natijalariga ko'ra, har bir rejim uchun samarali boshqaruv strategiyalarini ishlab chiqish mikrogridlarning ishonchlilik va samaradorligini oshirishda muhim ahamiyat kasb etadi.

**Kalit so'zlar:** taqsimlangan generatsiya, ishlash rejimlari, mikrogrid, statik kalit, avtonom ish rejimi, tarmoqqa ulangan rejim, quvvat oqimi, chastota barqarorligi, energiya samaradorligi

### 1. Kirish

So'nggi yillarda elektr energiyasiga bo'lgan talabning ortishi, qayta tiklanuvchi energiya manbalarining keng qo'llanilishi va iste'molchilarning energiya ta'minotiga bo'lgan talablarining o'zgarishi natijasida mikrogrid texnologiyalari jadal rivojlanmoqda. Ko'mir, neft va tabiiy gaz kabi qazilma yoqilg'ilarni elektr energiyasi ishlab chiqarishda qo'llash bir qator muammolarni keltirib chiqaradi, jumladan, issiqxona gazlari chiqindilari va global isish. Toza va barqaror energiyaga bo'lgan talabning ortishi hamda dunyoning turli hududlarida sodir bo'lgan yirik

avariya hodisalari taqsimlangan generatsiya manbalarini qazilma yoqilg'ilarga muqobil sifatida ilgari surilishiga sabab bo'ldi. Biroq taqsimlangan generatsiya manbalarini elektr ta'minot tizimiga joriy etish tarmoq uchun bir qator jiddiy muammolarni yuzaga keltiradi.

An'anaviy elektr tarmoqlari radial tuzilishga ega bo'lib kelgan. Taqsimlangan generatsiya manbalarining kiritilishi esa tarmoqdagi quvvat oqimini ikki yo'nalishli qiladi, ya'ni energiya taqsimlangan generatsiya manbalaridan ham asosiy elektr tarmog'idan oqishi mumkin. Bu holat tizimning kuchlanish profili, quvvat sifati, xavfsizlik, quvvat oqimini

<sup>a</sup> <https://orcid.org/0009-0009-2520-8995>

<sup>b</sup> <https://orcid.org/0009-0007-4146-4062>

<sup>c</sup> <https://orcid.org/0009-0008-3336-7016>



boshqarish, chastota nazorati va himoya masalalari bo'yicha bir qator muammolarni keltirib chiqaradi.

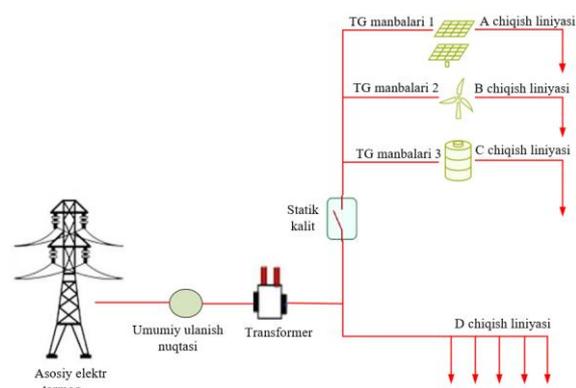
Taqsimlangan generatsiya manbalariga yagona, qisqa va aniq ta'rif mavjud emas. Turli tashkilotlar va tadqiqotchilar uni o'z qarashlari va yondashuvlariga asoslanib turlicha ta'riflaydilar. Men esa uni quyidagicha ta'riflayman: Taqsimlangan generatsiya manbalari - bu elektr energiyasini ishlab chiqarish markazlashtirilgan yirik elektr stansiyalardan emas, balki iste'molchi yaqinida yoki tarmoq ichida joylashgan kichik quvvatli manbalarda amalga oshiriladigan tizimdir. Shu o'rinda ta'kidlash joizki, taqsimlangan generatsiya manbalarini qayta tiklanuvchi energiya bilan adashtirmaslik kerak, chunki taqsimlangan generatsiya manbalari tarkibida qayta tiklanuvchi texnologiyalar, qayta tiklanmaydigan texnologiyalar yoki ularning kombinatsiyasi bo'lishi mumkin.

## 2. Tadqiqot metodologiyasi

**Mikrogridlar (kichik elektr tarmoqlar)** - bu aniq belgilangan elektr chegaralariga ega bo'lgan, o'zaro bog'langan yuklamalar va taqsimlangan energiya manbalari guruhi bo'lib, ular tarmoqqa nisbatan yagona boshqariladigan subyekt sifatida ishlaydi hamda tarmoqqa ulanib yoki ajralib, tarmoqqa ulangan yoki Avtonom ish rejimida ishlashi mumkin. Mikrogridlarga ulangan manbalar mikromanbalar deb ataladi. Ular tarkibiga quyidagilar kiradi: quyosh fotoelektr panellari, shamol turbinalari, sinxron generatorlar, birgalikda issiqlik va elektr ishlab chiqarish qurilmalari, mikroturbinalar, yoqilg'i elementlari, superkondensatorlar, asinxron generatorlar, elektr transport vositalari hamda akkumulyator energiya saqlash tizimlari. Mikrogridlar ikkita tarmoqqa ulangan va avtonom ish rejimida ishlaydi.

**Tarmoqqa ulangan rejim.** Ushbu rejimda asosiy elektr tarmog'i faol bo'ladi. Statik o'chirgich (static switch) yopiq holda ishlaydi. Barcha ta'minot liniyalari (feederlar) o'z energiyasini asosiy tarmoqdan oladi. Boshqacha aytganda, muhim yuklamalar (A, B va C liniyalardagi) hamda muhim bo'lmagan yuklamalar (D liniyadagi) asosiy tarmoq tomonidan ta'minlanadi. 1-rasmda ushbu holat tasvirlangan.

Tarmoqqa ulangan rejimning bir qator afzalliklari va ayrim kamchiliklari mavjud. Asosiy tarmoqda uzilish yoki nosozlik yuzaga kelganda, odatiy mikrogrid iste'molchi yuklamalarida sezilarli uzilishlarsiz, silliq tarzda tarmoqqa ulangan rejimdan avtonom ishlash rejimiga o'ta oladi. Yuklama eng yuqori darajaga chiqqan paytlarda, asosiy tarmoqdagi ishdan chiqish xavfini yuklamani kamaytirish orqali oldini olish mumkin. Yana bir afzallik - generatorning iste'molchi nuqtasiga yaqin joylashuvi tufayli elektr energiyasi bilan birga issiqlik energiyasidan ham foydalanish imkoniyati bo'lib, bu umumiy energiya samaradorligini oshiradi. Ushbu rejimda mikrogrid va asosiy tarmoq o'rtasida faol va reaktiv quvvat almashinuvi orqali yordamchi xizmatlarni ko'rsatish mumkin. Biroq, avtonom ishlash rejimida bunday imkoniyat mavjud emas, chunki bu rejimda mikrogrid ichida ishlab chiqarilgan haqiqiy va reaktiv quvvat, shu jumladan energiya saqlash tizimi yordamida ishlab chiqarilgan quvvat, mahalliy yuklamalar talabiga muvofiq muvozanatda bo'lishi lozim.



1-rasm Tarmoqqa ulangan rejim

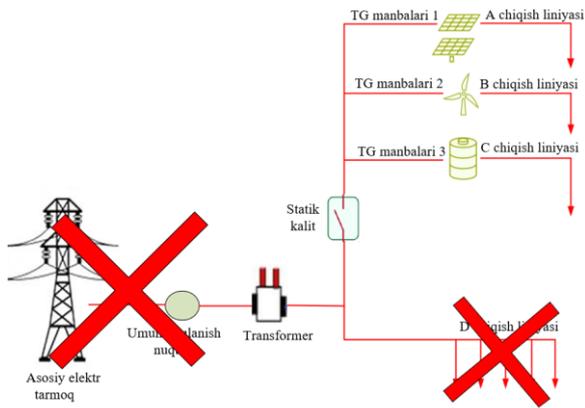
### Tarmoqqa ulangan rejimning afzalliklari va kamchiliklari

Tarmoqqa ulangan rejimning ayrim kamchiliklari ham mavjud. Eng asosiy muammolardan biri-mikrogridni asosiy elektr tarmog'i bilan qayta sinxronlash jarayoni murakkabligidir. Bu jarayonda kuchlanish, chastota va quvvat sifati belgilangan me'yorlarga mos ravishda boshqarilishi, shu bilan birga quvvat va energiya balansi saqlanishi lozim. Ba'zi holatlarda mikrogrid asosiy tarmoqqa garmonik tebranishlar yoki doimiy tok oqimlarini uzatishi mumkin. Ushbu parametrlarning yuqori darajada bo'lishi asosiy elektr tarmog'ining ishlash xususiyatlariga zarar yetkazishi mumkin. Ularni qoniqarli darajada ushlab turish katta texnik murakkabliklarni keltirib chiqaradi.

Tarmoqqa ulangan rejimda quvvat oqimi asosiy tarmoqdan mikrogridga va aksincha yo'nalishda sodir bo'lishi mumkin. Bu esa teskari quvvat oqimini yuzaga keltirib, himoya tizimlari koordinatsiyasida murakkabliklarga, noxush quvvat oqimi yo'nalishlariga, asossiz ishlovchi o'chirishlarga, tarmoqning nomaqbul avtonom ishlash holatiga, avtomatik qayta ulanishning oldini olishga va nosozlik oqimlarini tarqatishda muammolarga olib kelishi mumkin. Taqsimlangan generatsiya manbalarining boshqaruv tizimlari o'zaro ta'siri natijasida, ayniqsa inverter orqali ulanadigan taqsimlangan generatsiyalar bilan ishlashda, mahalliy tebranishlar paydo bo'lishi ehtimoli mavjud bo'lib, bu holat kichik buzilishlar barqarorligini chuqur tahlil qilishni talab etadi. Shuningdek, mikrogridning tarmoqqa ulangan va avtonom ishlash rejimlari o'rtasida uzluksiz va muammosiz o'tishni ta'minlash uchun o'tkinchi barqarorlik tahlillari o'tkazilishi zarur. Bundan tashqari, avtonom ishlash rejimini aniqlashning samarali usullarini ishlab chiqish ham talab etiladi.

**Avtonom ish rejimida ishlash:** Ushbu rejimda asosiy tarmoq uzilgan bo'lib, elektr energiyasini yetkazib bermoqda. Asosiy tarmoqdagi uzilish avariya holati yoki texnik xizmat ko'rsatish maqsadida amalga oshirilishi mumkin. Bu holatda statik kalit ochiq bo'ladi. Mikromanbalar A, B va C liniyalarini ta'minlaydi. D liniyasi esa nofaol bo'lib qoladi, chunki u sezgir yuklamalar qatoriga kirmaydi. Boshqacha aytganda, kritik yuklamalar mikromanbalar orqali elektr energiyasi bilan ta'minlanadi, kritik bo'lmagan yuklamalar esa (D liniyasida) tizimdan uzib qo'yiladi. 2-rasmda ushbu holat tasvirlangan.





2-rasm Avtonom ish rejimi

### Avtonom ish rejimining afzalliklari va kamchiliklari

Mikrotarmoqlarning Avtonom ish rejimida ishlashi bir qator afzalliklar va kamchiliklarga ega. Ushbu rejimda mikrotarmoq iste'molchilarning elektr energiyasi xarajatlarini kamaytirishi mumkin, chunki energiya ehtiyojining bir qismi yoki to'liq hajmi o'zida ishlab chiqariladi. Bundan tashqari, bu rejim elektr energiyasini an'anaviy usullar orqali yetkazib berish qiyin bo'lgan olis hududlarga yetkazib berish imkonini yaratadi. Avtonom ish rejimida ishlash ekologik ta'sirning ijobiylashishi va uglerod chiqindilarining kamayishini ta'minlaydi, chunki bu rejimdagi taqsimlangan generatsiya manbalarining katta qismi shamol va quyosh panellari kabi qayta tiklanuvchi energiya manbalaridir. Shuningdek, energiya manbalari va yuklamalar o'rtasidagi masofa qisqa bo'lgani sababli, tarmoqqa ulangan rejimga nisbatan energiya samaradorligi yuqoriroq bo'ladi, chunki energiya yo'qotishlari kamayadi.

Mahalliy taqsimlangan generatsiya manbalaridan foydalanish, jamoalar va korxonalarni kelajakdagi kutilmagan holatlarga, masalan, kuchli bo'ronlar, zilzilalar, dovullar yoki asosiy tarmoqdan kelayotgan energiya ta'minotidagi uzilishlarga nisbatan chidamliroq qiladi. Buning sababi shundaki, mikromanbalar zarurat paytida energiyani katta markazlashgan elektr stansiyalariga qaraganda tezroq va samaraliroq yetkazib bera oladi. Bu esa o'z navbatida avtonom ish rejimida narx barqarorligini ta'minlashga yordam beradi. Biroq, avtonom ish rejimining ayrim kamchiliklari ham mavjud. Elektr energiyasi maxsus batareya bloklarida zaxiralaniishi talab qilinadi, bu esa ko'proq joy va texnik xizmat ko'rsatishni talab etadi. Bundan tashqari, ayniqsa himoya sxemalarini loyihalashda, mikrotarmoq tarkibiy qismlari o'rtasida samarali aloqa tizimi zarur bo'ladi. Aloqa infratuzilmasini qurish qimmat va yuqori texnik malakani talab qiladi.

Tarmoqqa ulangan rejimda katta miqdordagi sinxron generatorlar tufayli tizimning inertsiya zaxirasi katta bo'lsa, Avtonom ish rejimida inertsiya past bo'lishi mumkin, ayniqsa quvvat elektronika interfeysli taqsimlangan generatsiya manbalari ulushi katta bo'lsa. Bunday interfeys tizimning dinamik xususiyatlarini yaxshilashi mumkin, ammo yetarli boshqaruv mexanizmi bo'lmasa, past inertsiya chastotaning keskin o'zgarishiga olib kelishi mumkin.

Avtonom ish rejimida iqtisodiy va barqaror ishlash uchun turli xil taqsimlangan generatsiya manbalari birliklari o'rtasida muayyan darajada muvofiqlashtirish talab etiladi. Bu jarayon talab va taklif muvozanati juda muhim bo'lgani va komponentlar ishdan chiqish ehtimoli yuqori bo'lgani

sababli murakkablashadi. Bundan tashqari, yuklama kuchlanish profili va ob-havo prognozi kabi parametrlarning noaniqligi ham hisobga olinishi kerak. Bu noaniqlik, tarmoqqa ulangan rejimga nisbatan, yuklama hajmining kichikligi va taqsimlangan generatsiya manbalarining yuqori korrelyatsiyasi tufayli yanada kattaroq bo'ladi. Shuningdek, Avtonom ish rejimida muayyan me'yoriy talab mavjud - u asosiy tarmoq bilan hamkorlikda ishlashi kerak. Bu esa, mikrotarmoq iste'molchilari asosiy tarmoqning ishlashi va texnik xizmat ko'rsatish xarajatlarining bir qismini qoplashlari lozimligini anglatadi.

### 3. Xulosa

Taqsimlangan generatsiya asosidagi mikrogridlar zamonaviy elektr energetika tizimlarida energiya samaradorligini oshirish, energiya yetkazib berishning ishonchligini ta'minlash va qayta tiklanuvchi manbalardan keng foydalanishni rivojlantirishda muhim o'rin tutadi. Tadqiqotlar shuni ko'rsatadiki, mikrogridlarning tarmoq bilan ulangan va avtonom ishlash rejimlari o'zaro farqli boshqaruv strategiyalarini talab qiladi. Statik kalitlar yordamida rejimlarni tezkor almashtirish energiya ta'minotining uzluksizligini ta'minlaydi, ammo yuklarni muvozanatlashtirish, quvvat oqimini optimallashtirish va chastota-napryajeniye barqarorligini saqlash kabi muammolar yuzaga keladi.

Tadqiqot natijalari mikrogrid boshqaruvida markazlashgan va markazlashmagan yondashuvlarni uyg'un qo'llash, real vaqt monitoring tizimlarini joriy etish hamda quvvat manbalarini optimal taqsimlash orqali tizim samaradorligini sezilarli darajada oshirish mumkinligini tasdiqlaydi. Shu bilan birga, mikrogridlarni keng joriy etish uchun standartlashtirish, himoya avtomatikasi va kibernetika sohasida qo'shimcha tadqiqotlar zarur.

### Foydalangan adabiyotlar / References

- [1] Aggelos, S., Bouhours., Paschalis, A., Gkaidatzis., Dimitris, P., Labridis. Network Reconfiguration in Modern Power Distribution Networks. (2020). doi: 10.1007/978-3-030-36115-0\_7.
- [2] Huang S., Wu Q., Cheng L., Liu Z. Optimal Reconfiguration Based Dynamic Tariff for Congestion Management and Line Loss Reduction in Distribution Networks. IEEE Transactions on Smart Grid, 2015. DOI: 10.1109/TSG.2015.2419080.
- [3] Gonen, T. (2014). Electric Power Distribution Engineering (3rd ed.). CRC Press.
- [4] IEEE Std 1547™-2018. Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces. IEEE.
- [5] Lasseter, R. H. (2011). Smart distribution: Coupled microgrids. Proceedings of the IEEE, 99(6), 1074–1082.
- [6] Guerrero, J. M., Chandorkar, M., Lee, T. L., & Loh, P. C. (2013). Advanced control architectures for intelligent microgrids—Part I: Decentralized and hierarchical control. IEEE Transactions on Industrial Electronics, 60(4), 1254–1262.
- [7] Katiraei, F., Iravani, R., Hatziargyriou, N., & Dimeas, A. (2008). Microgrids management—Controls and



operation aspects of microgrids. IEEE Power and Energy Magazine, 6(3), 54–65.

[8] Lopes, J. A. P., Moreira, C. L., & Madureira, A. G. (2006). Defining control strategies for microgrids islanded operation. IEEE Transactions on Power Systems, 21(2), 916–924.

[9] Olivares, D. E., Mehrizi-Sani, A., Etemadi, A. H., Cañizares, C. A., Iravani, R., Kazerani, M., ... & Jiménez-Estévez, G. A. (2014). Trends in microgrid control. IEEE Transactions on Smart Grid, 5(4), 1905–1919.

[10] Lasseter, R. H., & Paigi, P. (2004). Microgrid: A conceptual solution. IEEE 35th Annual Power Electronics Specialists Conference (Vol. 6, pp. 4285–4290). IEEE.

### Mualliflar to‘g‘risida ma‘lumot/ Information about the authors

Tolipov Jamshid Nurbekovich / Jamshid Tolipov	O‘zbekiston Respublikasi Fanlar akademiyasi Energetika muammolari instituti, katta ilmiy xodimi PhD, k.i.x.
--------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------

E-mail:

[tolipovjamshidn@gmail.com](mailto:tolipovjamshidn@gmail.com)

Tel.: +99893 565-22-08

<https://orcid.org/0009-0009-2520-8995>

---

Saidov Azimjon  
Husan o‘g‘li /  
Azimjon Saidov

Muhammad al-Xorazmiy nomidagi  
Toshkent axborot texnologiyalari  
universiteti ma‘naviyat va ma‘rifat  
bo‘limi, tyutor

E-mail:

[azimjonsaidov0812@gmail.com](mailto:azimjonsaidov0812@gmail.com)

Tel.: +99890 922-97 94

<https://orcid.org/0009-0007-4146-4062>

---

Mahamadjonov  
Sodiqjon  
Yo‘ldashboy  
o‘g‘li /  
Sodikjon  
Makhamadjonov

Andijon davlat texnika instituti  
“Elektr muhandisligi” katta  
o‘qituvchisi, PhD

E-mail: [s.mahamadjonov@mail.ru](mailto:s.mahamadjonov@mail.ru)

Tel.: +99893 443 30 80

<https://orcid.org/0009-0008-3336-7016>



- S. Razzakov, A. Martazaev, I. Egamberdiev, A. Akhmedov**  
*Strength calculation of reinforced concrete beam reinforced with glass fibers.....133*
- O. Kopytenkova, L. Levanchuk, Z. Tursunov**  
*Modern methodological approaches to assessing health risks of the working population.....139*
- O. Kopytenkova, L. Levanchuk, Z. Tursunov**  
*Methodological approaches to organizing control of acoustic load from railway transport.....144*
- Z. Mirzaeva, Sh. Temirova**  
*Promising directions for the development of automation of geodetic survey in the construction of the metropoliten.....147*
- E. Khidirov**  
*Determination of the reliability of rolling stock derailment control devices.....152*
- J. Tolipov, A. Saidov, S. Makhamadjonov**  
*Operating modes and control challenges of microgrids based on distributed generation.....156*
- J. Tolipov, Sh. Murtazov**  
*Improving power quality using filtered compensation devices.....160*