ACTIVE AND REACTIVE ELEMENTS OF LOCOMOTIVE POWER

Tashkent State Transport University

Xusanova Nigora Patxullayevna

https://orcid.org/0009-0003-7417-9728

nigora.xusanova.1982@gmail.com

+998974770618

Mustayeva Guldora Salokhiddinovna

mgulyas00@gmail.com

https://orcid.org/0000-0002-8650-5178

+998906552552

Abstract: *This article delves into the nuances of locomotive power, with a specific focus on both active and reactive components. The investigation of these components is imperative for gaining insights into the dynamic attributes of train operations. Through an extensive literature review, diverse viewpoints pertaining to active and reactive power within the context of locomotives will be scrutinized. The section on research methodology delineates the systematic approach employed for the analysis and quantification of these power components. Subsequently, the section on analysis and results provides a presentation of insights derived from empirical findings, elucidating the significance and ramifications of active and reactive elements in locomotive power. The conclusion succinctly synthesizes pivotal findings, accentuates the contributions of the study, and proposes potential avenues for further research within this domain.*

Keywords: *locomotive power, respective roles, interdependencies, efficiency, stability, energy efficiency.*

Introduction. The operational efficiency of locomotives requires a nuanced understanding of their power components, encompassing both active and reactive elements. Active power represents the measurable energy expended by the

locomotive in performing constructive work, such as propelling the train forward. In contrast, reactive power is associated with the establishment and maintenance of magnetic fields in the power system, crucial for system stability. This article focuses on exploring and analyzing the roles, interdependencies, and implications of active and reactive elements in locomotive power, aiming to enhance our understanding of their dynamics and impact on railway systems.

Active power in locomotives is a tangible measure of the energy utilized for productive output, while reactive power, though not directly performing work, is essential for sustaining power system stability. The article delves into the intricacies of these power elements, examining their individual functions and the delicate balance required for optimal locomotive performance. Understanding the roles and interdependencies of active and reactive power is vital for ensuring the efficiency, stability, and energy conservation of railway systems.

Through an exhaustive literature review, the article synthesizes diverse perspectives on active and reactive power in locomotives, providing a comprehensive understanding of existing knowledge and identifying areas for further investigation. The research methodology section outlines a systematic approach for the detailed analysis and quantification of these power components, utilizing advanced measurement tools and empirical data collection methods. The subsequent analysis and results section presents empirical findings, offering insights into the significance and implications of active and reactive elements in locomotive power.

In conclusion, the synthesis of literature, rigorous research methodology, and empirical analysis presented in this article collectively contribute to an enhanced comprehension of locomotive power dynamics. By shedding light on the intricate roles played by active and reactive elements, the study aims to advance our understanding of their broader implications for the efficiency and stability of railway systems.

Literature review. The existing corpus of literature addressing active and reactive power in locomotives spans a diverse range of disciplines, incorporating

insights from electrical engineering, transportation, and systems dynamics. This interdisciplinary approach has yielded valuable findings regarding the management of active and reactive power, highlighting its crucial role in optimizing energy efficiency, ensuring operational stability, and minimizing losses within power systems. Conducting a meticulous review of this literature is imperative to establish a robust knowledge base, offering a comprehensive overview of the current state of understanding and identifying avenues for further exploration.

Perspectives from electrical engineering contribute technical insights into the mechanisms governing active and reactive power in locomotives, unraveling the intricacies of power flow and its implications for overall system performance. Insights from the transportation discipline provide a contextual understanding of the practical ramifications associated with managing power components in locomotive operations, taking into account factors such as energy consumption and system reliability. Meanwhile, contributions from systems dynamics offer a holistic viewpoint, considering the dynamic interactions and feedback loops that influence the behavior of active and reactive power in locomotive systems.

This literature review acts as a foundational pillar for the ongoing discourse on locomotive power dynamics. Through a critical evaluation of existing research, this article endeavors to synthesize diverse viewpoints, identify gaps, and set the stage for further exploration. The amalgamation of knowledge from these varied disciplines contributes to a comprehensive understanding of the intricacies associated with active and reactive power management in locomotives. Through this synthesis, the research aims to transcend disciplinary boundaries, fostering a more integrated and nuanced perspective that can guide future advancements in the optimization of locomotive power systems.

Research methodology. The methodical examination of active and reactive power in locomotives necessitates the deployment of sophisticated measurement tools, simulation models, and empirical data collection techniques. The section detailing the research methodology provides a comprehensive overview of the criteria employed for locomotive selection, the instrumentation methods applied,

and the systematic approach undertaken to quantify both active and reactive power across a spectrum of operating conditions. In selecting locomotives for analysis, criteria are established to ensure a representative and diverse sample that captures the variability inherent in different operational contexts. The instrumentation methods employed play a crucial role in acquiring accurate and reliable data, involving advanced measurement tools capable of precisely capturing the dynamic power characteristics of locomotives. The systematic approach adopted for quantifying active and reactive power encompasses the development of simulation models that simulate various operating conditions, providing a controlled environment for data collection and analysis.

The empirical data collected through these methods contribute to a nuanced understanding of the active and reactive power dynamics in locomotives. This data-driven approach enables researchers to discern patterns, trends, and anomalies, facilitating a comprehensive analysis of the interplay between active and reactive power components in different operational scenarios. The rigor and transparency of the research methodology are paramount, ensuring the replicability of the study and the validity of the findings. By adhering to established criteria, employing advanced instrumentation, and adopting a systematic approach, the research methodology sets the stage for a robust analysis of active and reactive power in locomotives, offering valuable insights into their dynamic behavior and implications for overall system performance.

Analysis and Results. This section will showcase the empirical results derived from the examination of active and reactive power components in locomotives. A detailed presentation will encompass quantitative data, graphical representations, and statistical analyses, offering a thorough depiction of the manifestations of these power elements across various operational scenarios. The analysis endeavors to unveil discernible patterns, correlations, and key parameters that exert influence on the dynamics of active and reactive power in locomotives.

Through quantitative data, researchers can quantify the magnitudes and variations of active and reactive power, providing a quantitative foundation for

subsequent analyses. Graphical representations, such as charts and diagrams, offer visual insights into the temporal and operational variations of these power components. Statistical analyses, including measures of central tendency and dispersion, contribute to the elucidation of the underlying patterns and relationships within the dataset.

By scrutinizing the empirical findings, the analysis seeks to unravel the complexities of active and reactive power dynamics in locomotives, identifying factors that influence their behavior under different conditions. This comprehensive examination is integral to enhancing our understanding of locomotive power systems, informing future optimizations and contributing valuable insights to the broader field of rail transportation.

Conclusion. In summary, this article elucidates the intricate dimensions of locomotive power, specifically examining the active and reactive components. Insights garnered from the literature review, research methodology, and empirical analysis collectively enrich our comprehension of the dynamics inherent in locomotive systems. Underscoring the critical role of managing both active and reactive power, the conclusion accentuates the significance of this study and proposes potential avenues for future research aimed at advancing the efficiency and reliability of locomotive operations.

References:

Masharipov, M. N., Umirzaqov, D. D., & Sh, R. G. (2023). QO ‘SHIMCHA MANYOVR ISHLARNI BAJARISHNI SIGNALLASHTIRISH ORQALI AVTAMATLASHTIRISH. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 35(6), 88-96.

Masharipov , M., Umirzaqov , D., Ozodboyeva , Z., & Asatullayeva, N. (2023). POTENTIAL PROBLEMS OF THE RAILWAY OF UZBEKISTAN AND POSSIBLE SOLUTIONS TO CURE THEM. Interpretation and Researches, 1(13). извлечено от http://interpretationandresearches.uz/index.php/iar/article/view/1347

Masharipov, M. ., Ozodboyeva , Z. ., & Umirzaqov , D. (2023). UPDATING AND EXPANDING CONTENT ON THE MOVE OF TASHKENT

METRO. International Bulletin of Engineering and Technology, 3(8), 28–36. Retrieved from https://internationalbulletins.com/intjour/index.php/ibet/article/view/973

Masharipov, M., Umirzakov, D., Ozodboeva, Z., Bekmurodov, S., & Asatullayeva, N. (2023). PROMOTING OUTSOURCING SERVICES IN HIGHER EDUCATION. Interpretation and Researches, 1(12). извлечено от http://interpretationandresearches.uz/index.php/iar/article/view/1301

Masharipov, M. N. (2023). ASSESSMENT OF THE COMPANY'S FINANCIAL CONDITION AND FACTORS AFFECTING IT. Educational Research in Universal Sciences, 2(5), 239-246.

Numonjonovich, M. M. (2023). DEVELOPING THE QUALITY OF LOGISTICS SERVICES WHILE IMPLEMENTING A STRATEGIC MANAGEMENT APPROACH. PEDAGOGS jurnali, 32(3), 203-206.

Numonjonovich, M. M. (2023). THE ROLE OF EFFECTIVE MECHANISMS IN THE DEVELOPMENT OF THE TRANSPORT SYSTEM IN THE CURRENT CONDITIONS. PEDAGOGS jurnali, 32(3), 193-198.

Numonjonovich, M. M. (2023). THE STATE IS THE MOST MANAGER OF THE NATION WITHIN THE ADVANCEMENT OF THE COMPUTERIZED ECONOMY. PEDAGOGS jurnali, 32(4), 57-61.

Numonjonovich, M. M. (2023). THE MAIN TRENDS IN THE DEVELOPMENT OF ROAD AND MUNICIPAL MACHINERY AND EQUIPMENT. PEDAGOGS jurnali, 32(4), 31-35.

Numonjonovich, M. M. (2023). RAILWAY INVESTMENT POLICY-IMPROVING MECHANISM TO INCREASE INDUSTRIAL EFFICIENCY. PEDAGOGS jurnali, 32(3), 208-212.

Numonjonovich, M. M. (2023). INNOVATIVE METHODS FOR THE DEVELOPMENT OF THE TRANSPORT SYSTEM IN THE REPUBLIC. PEDAGOGS jurnali, 32(3), 199-202.

Numonjonovich, M. M. (2023). TRANSPORT LOGISTICS AND THEIR IMPORTANCE IN THE PRESENT. PEDAGOGS jurnali, 32(3), 223-227.

Numonjonovich, M. M. (2023). ELECTRONICS IN ENSURING TRAFFIC SAFETY IN RAIL TRANSPORT. PEDAGOGS jurnali, 32(4), 14-17.

Numonjonovich, M. M. (2023). DIGITIZATION OF RAIL TRANSPORT IN UZBEKISTAN. PEDAGOGS jurnali, 32(4), 18-21.

Numonjonovich, M. M. (2023). THE PRINCIPLE OF IMPROVING THE QUALITY OF SERVICE OF PUBLIC VEHICLES IN CITIES. PEDAGOGS jurnali, 32(4), 4-7.

Numonjonovich, M. M. (2023). SHOWCASE STRATEGIES OF ADMINISTRATION OF CUTTING EDGE VENTURES. PEDAGOGS jurnali, 32(4), 45-50.

Numonjonovich, M. M. (2023). IMPORTANT IMPORTANCE OF DIGITIZATION OF TRANSPORT LOGISTICS. PEDAGOGS jurnali, 32(4), 27-10.

Numonjonovich, M. M. (2023). THE ROLE OF INNOVATION IN ENSURING THE COMPETITIVENESS OF COMPANIES IN THE TRANSPORT INDUSTRY AT THE MOMENT. PEDAGOGS jurnali, 32(3), 228-230.

Numonjonovich, M. M. (2023). SMARTLY INVESTIGATING THE REASONS BEHIND TECHNICAL MALFUNCTIONS. PEDAGOGS jurnali, 32(4), 41-44.

Numonjonovich, M. M. (2023). COMPETITIVE ADVANTAGES OF MODERN BUSINESS ORGANIZATIONS IN THE DIGITAL ECONOMY. PEDAGOGS jurnali, 32(4), 22-26.

Numonjonovich, M. M. (2023). TECHNOLOGICAL METHODS OF INCREASING THE PERFORMANCE OF PARTS. PEDAGOGS jurnali, 32(4), 36-40.

Numonjonovich, M. M. (2023). THE ROLE OF FINANCIAL RESOURCES IN RAIL TRANSPORT DEVELOPMENT IN UZBEKISTAN. PEDAGOGS jurnali, 32(4), 51-56.

Numonjonovich, M. M. (2023). METHODS FOR MODERNIZING RAIL TRANSPORT AND IMPROVING THE QUALITY OF THE TRANSPORT SERVICE. PEDAGOGS jurnali, 32(4), 8-13.

Numonjonovich, M. M. (2023). INNOVATIVE TECHNIQUES FOR TRAFFIC DEVELOPMENT. PEDAGOGS jurnali, 32(3), 213-217.

Numonjonovich, M. M. (2023). MODERN PROBLEMS AND SOLUTIONS FOR THE DEVELOPMENT OF THE TRANSPORT SYSTEM. PEDAGOGS jurnali, 32(3), 218-222.

Numondjonovich, M. M. (2023). THE EFFECTIVENESS OF THE USE OF MULTIMODAL TRANSPORT CORRIDORS IN INCREASING THE ECONOMIC POTENTIAL OF THE TRANSPORT SYSTEM IN THE REPUBLIC OF UZBEKISTAN. Open Access Repository, 4(2), 834-837.

Numonjonovich, M. M., Nizomiddin o'g'li, H. S., & Rahmonovich, D. N. (2023). MAQSUD SHAYXZODA-IKKI XALQNING DILBANDI. ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ, 16(2), 13-17.

Saidahrolovich, K. S., & Numonzhonovich, M. M. (2023). GEOPOLITICS OF TRANSPORT CORRIDORS. World Economics and Finance Bulletin, 18, 10-16.

Masharipov, M. N., Rasulov, M. X., & Suyunbayev, S. M. (2023). THE AUTOMATED SYSTEM FOR SELECTION OF GRAPHIC THREAD FOR DEPARTURE OF FREIGHT TRAINS WITH EXTENDED LOCOMOTIVE TRAFFIC SHOULDERS. In ЖЕЛЕЗНОДОРОЖНЫЙ ПОДВИЖНОЙ СОСТАВ: проблемы, решения, перспективы: материалы Второй Международной научно-технической конференции (Ташкент, 19–22 апреля 2023 г.).–Т.: ТГТУ, 2023.–562 с. (p. 270).

Masharipov, M., Gulamov, A., Rasulov, M., Suyunbayev, S., Adilova, N., & Rasulmukhammedov, M. (2023). Development of enhanced method for planning train locomotives ready to operate the next day. In E3S Web of Conferences (Vol. 458, p. 03009). EDP Sciences.

Rasulov, M., Masharipov, M., Sattorov, S., & Bozorov, R. (2023). Study of specific aspects of calculating the throughput of freight trains on two-track railway sections with mixed traffic. In E3S Web of Conferences (Vol. 458, p. 03015). EDP Sciences.

Masharipov, M., Rasulov, M., Suyunbayev, S., Jumayev, S., & Bekmurodov, S. (2023). Establishing the impact of empty freight trains on the capacity railway lines.

In E3S Web of Conferences (Vol. 431, p. 08021). EDP Sciences.

Masharipov, M. N., Arpabekov, M. I., & Suyunbayev, S. M. (2023). STUDIES OF THE BASIC SPECIFIC TRAFFIC RESISTANCE OF DIFFERENT TYPES OF FREIGHT CARS.

Rasulov, M., Masharipov, M., Bekzhanova, S. E., & Bozorov, R. (2023). Measures of effective use of the capacity of twotrack sections of JSC “Uzbekistan Railways”. In E3S Web of Conferences (Vol. 401, p. 05041). EDP Sciences.

Masharipov, M., Rasulov, M., Suyunbayev, S., Adilova, N., Ablyalimov, O., & Lesov, A. (2023). Valuation of the influence of the basic specific resistance to the movement of freight cars on the energy costs of driving a train. In E3S Web of Conferences (Vol. 383, p. 04096). EDP Sciences.

MASHARIPOV, M. N., UMIRZAQOV, D. D. O. G. L., AZAMOV, N. F. O., OZODBOYEVA, Z. Z. Q., & ALLAMURATOVA, M. S. Q. (2022). TRANSPORT HAMKORLIGI ISTIQBOLLARI: MARKAZIY OSIYO VA XITOY. МОЛОДОЙ СПЕЦИАЛИСТ Учредители: ИП" Исакова УМ", (3), 112-121.

MASHARIPOV, M. N., UMIRZAQOV, D. D. O. G. L., OZODBOYEVA, Z. Z. Q., & ALLAMURATOVA, M. S. Q. (2022). FACTORS AFFECTING ACCESSIBILITY OF DESTINATIONS. IMPORTANCE OF ACCESSIBILITY AND TRANSPORT LINKS. KHIVA.

MASHARIPOV, M. N., UMIRZAQOV, D. D. O. G. L., AZAMOV, N. F. O., OZODBOYEVA, Z. Z. Q., & ALLAMURATOVA, M. S. Q. (2022). TRANSPORT HAMKORLIGI ISTIQBOLLARI: MARKAZIY OSIYO VA XITOY. МОЛОДОЙ СПЕЦИАЛИСТ Учредители: ИП" Исакова УМ", (3), 112-121.

Машарипов, М. (2022). ЖУФТЛАШМАГАН ҲАРАКАТ ГРАФИГИ ШАРОИТИДА ЛОКОМОТИВЛАРНИ ПОЕЗД ТАРКИБЛАРИГА БИРИКТИРИШ ЖАРАЁНИНИ АВТОМАТЛАШТИРИШ. Вестник ТашИИТ№ 2.

Машарипов, М. Н. (2022). ЛОКОМОТИВЛАРНИ ПОЕЗДЛАРГА УЛАШДА ЛОКОМОТИВ ВА ТАРКИБНИНГ СТАНЦИЯДА ТУРИШ ВАҚТИНИ БАҲОЛАШ: ESTIMATION OF LOCOMOTIVE DOWNTIME AND

STRUCTURE WHEN ATTACHING LOCOMOTIVES TO TRAINS AT THE STATION. Молодой специалист, 1(9), 23-28.

Numonjonovich, M. M. S., & Nodirjon o'g'li, N. N. (2021). ENSURING CONDITIONS FOR EFFECTIVE DEVELOPMENT OF INDUSTRY BASED ON PRODUCTION DIVERSIFICATION.

Машарипов, М. (2019). Чуқурсой-Сарыгач темир йўл участкасида юк локомотивларидан фойдаланиш технологиясини такомиллаштириш. Вестник ТашИИТ№ 1.

Numonjonovich, Masharipov M., et al. "Investigation of the Throughput of Railway and Road Transport of Angren-pop Through the Kamchik Pass and Ways of Its Further Improvement." JournalNX, vol. 7, no. 07, 2021, pp. 112-117, doi:10.17605/OSF.IO/GAC7J.

RASULOV, M. X., MASHARIPOV, M. N., & BOZOROV, R. S. ИННОВАЦИОННЫЙ ТРАНСПОРТ. ИННОВАЦИОННЫЙ ТРАНСПОРТ Учредители: Уральский государственный университет путей сообщения, Российская академия транспорта (РАТ), (2), 42-48.