

$$M(x) = \left( M_{01} + Q_{01}x - \frac{q_1 x^2}{2} \right) H(l - x) - \left( M_{02} \eta_1(x - l) + \frac{Q_{02}}{\beta} \eta_3(x - l) \right) H(x - l), \quad (6)$$

where  $\beta = \sqrt[4]{k_y D / 4EJ_z}$  is a coefficient,  $H(x)$  is Heaviside's function;  
 $\eta_1(x) = e^{-\beta x} (\cos \beta x + \sin \beta x)$ ;  $\eta_2(x) = e^{-\beta x} (\cos \beta x - \sin \beta x)$ ;  $\eta_3(x) = e^{-\beta x} \sin \beta x$ .

The support reaction of the oil pipeline is equal to the jump in the transverse force curve that occurs above the overpass support. A characteristic feature of the presented dependences (5), (6) is the wave-like changes in the functions of internal loads at the beginning of the underground section of the oil pipeline with gradual damping when moving away from the edge of this section. We call such an effect the marginal effect of the change in the stress state of the underground section of the oil pipeline, and the length over which this effect has significant manifestations is the length of the marginal effect. The damping of the marginal effect is explained by the presence in Equations (5) and (6) of the functions  $\eta_i$ , which contain the multiplier  $e^{-\beta x}$ . This multiplier goes to zero if the product  $\beta x$  goes to infinity.

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### **MODERN TECHNOLOGY IS TRANSFORMING LANGUAGE LEARNING AND COMMUNICATION**

**Introduction.** In today's increasingly interconnected world, the ability to communicate across linguistic boundaries has become not only advantageous but

essential. Multilingualism, once considered a specialized skill, is now recognized as a fundamental asset for navigating globalized societies, fostering cultural understanding, and unlocking economic opportunities. As globalization accelerates and digital technologies continue to advance, the landscape of multilingualism is undergoing a profound transformation, propelled by innovative tools and platforms that are reshaping the way we learn, translate, and communicate in multiple languages.

The convergence of globalization and digital connectivity has ushered in an era of unprecedented linguistic diversity and intercultural exchange. People from different linguistic backgrounds interact daily, whether through business transactions, academic collaborations, or social media interactions. In this dynamic and multicultural landscape, the ability to speak multiple languages has emerged as a key facilitator of communication, enabling individuals to bridge cultural divides, forge meaningful connections, and thrive in diverse environments.

At the heart of this multilingual revolution lies modern technology, which has democratized language learning, translation, and communication, making these essential skills more accessible and inclusive than ever before. From mobile language learning apps to advanced machine translation technologies, voice recognition software, language teaching robots, and online language communities, the possibilities for multilingualism are vast and diverse, offering individuals unprecedented opportunities to engage with languages and cultures in meaningful and transformative ways.

In this article, we will explore how modern technology is revolutionizing the world of multilingualism. We will delve into the innovative tools and platforms that are empowering individuals to learn new languages, break down language barriers, and connect with people from around the world. From the classroom to the boardroom, from the streets of urban centres to the farthest reaches of the internet, modern technology is transforming the way we think about language and culture, opening up new horizons for communication, collaboration, and understanding in an increasingly interconnected global society. Join us as we embark on a journey into the multilingual revolution of the 21st century, where language is no longer a barrier but a bridge to a more inclusive, interconnected, and harmonious world.

In an era defined by globalization and digital connectivity, multilingualism has emerged as a crucial skill and a gateway to cultural exchange, economic opportunity, and global understanding. With the advent of modern technology, the landscape of multilingualism is undergoing a profound transformation, with innovative tools and platforms revolutionizing language learning, translation, and communication across borders. In this article, we explore the various ways in which modern technology is shaping the world of multilingualism and empowering individuals to engage with languages and cultures in unprecedented ways.

**Language Learning Apps.** Mobile applications have revolutionized language learning, making it more accessible, convenient, and personalized than ever before.

Hubbard, P., Braden-Harder, L. (2020) studied and proved the benefits of different applications on language acquisition. Apps such as Duolingo, Babbel, Rosetta Stone, and Lingodeer offer interactive language courses in multiple languages, leveraging gamification, spaced repetition, and adaptive learning algorithms to create engaging and effective learning experiences. Users can learn at their own pace, track their progress, and practice their language skills anytime, anywhere, using their smartphones or tablets. These apps also offer a wide range of languages, including less commonly taught languages, providing learners with opportunities to explore diverse linguistic landscapes.

**Machine Translation.** Machine translation technologies have transformed the way we communicate across language barriers, enabling instant translation of text and speech in real-time. Vaswani, A. (2017) introduced the transformer architecture, which revolutionized the way machine learning models handle sequential data.

Platforms like Google Translate, Microsoft Translator, DeepL, and Translate.com use artificial intelligence and neural machine translation algorithms to translate content between multiple languages with remarkable accuracy and speed. These tools facilitate cross-cultural communication, knowledge sharing, and access to information in diverse linguistic contexts, bridging the gap between speakers of different languages. Moreover, advancements in machine translation technology have led to the development of specialized translation tools for specific domains, such as legal, medical, and technical translation, further expanding the applications of multilingual communication.

**Language Learning Platforms.** Online language learning platforms offer a wealth of resources and services for language learners, catering to diverse learning styles, preferences, and goals. Platforms like FluentU, Memrise, iTalki, and Coursera provide a wide range of multimedia content, interactive lessons, virtual tutors, and language exchange opportunities, enabling users to immerse themselves in their target language and culture. Godwin-Jones, R. (2011) pointed out the role of technology in language learning and focused on the platform iTalki which facilitates autonomous learning by providing learners with access to a diverse range of language resources and opportunities for interaction.

These platforms leverage technology to create dynamic and engaging learning environments, fostering language acquisition, fluency, and cultural competence. Additionally, online language courses and certifications offered by universities and educational institutions allow learners to formalize their language skills and enhance their professional prospects.

**Language Teaching Robots.** Language teaching robots represent the cutting edge of language education technology, using artificial intelligence, natural language processing, and interactive dialogue to engage learners in immersive language learning experiences.

Kennedy, J., Baxter, P. (2014) propose a framework where robots adapt their teaching strategies based on individual student responses and learning styles. This adaptive approach aims to personalize the learning experience for students, leading to improved engagement and learning outcomes. The study explores how robots can dynamically adjust their interactions with students to provide tailored support and feedback, ultimately fostering a more effective learning environment.

Robots like EMYS (Educational MY Smart Robot), TALKing, and Nao employ interactive dialogue, facial expressions, and personalized feedback to support language learning and practice. These robots provide a novel and engaging approach to language education, particularly for children and individuals with diverse learning needs. Moreover, language teaching robots have the potential to assist language teachers in

classroom settings, enhancing the effectiveness of language instruction and providing personalized support to students.

**Voice Recognition Technology.** Voice recognition technology has revolutionized human-computer interaction, enabling users to interact with devices and applications using natural language commands and speech input. Virtual assistants like Apple's Siri, Amazon's Alexa, Google Assistant, and Microsoft's Cortana understand and respond to users' spoken requests in multiple languages, facilitating hands-free communication and access to information. These technologies support multilingualism by breaking down language barriers and making communication more intuitive and accessible across linguistic boundaries. Moreover, advancements in voice recognition technology have led to the development of language learning applications and interactive language games that utilize speech recognition for pronunciation practice and language assessment.

The work of Lee, H. (2018) provides an overview of voice recognition technology, including its current applications, challenges, and potential future trends. The author discusses how voice recognition technology has evolved and expanded its use in various fields such as virtual assistants, speech-to-text systems, and voice-controlled devices.

**Online Language Communities.** Social networking platforms and online communities have become invaluable resources for language learners, providing opportunities for language practice, cultural exchange, and collaborative learning. Belz, J. A., Thorne, S. L. (2006) studied and proved that the involvement of students in online language exchange programs with the aim of meaningful interactions with native speakers of the target language will obviously lead to enhanced language proficiency and intercultural competence. Platforms like Reddit's language learning subreddits, language exchange websites like Tandem, HelloTalk, and Speaky, and language-specific forums and chat groups connect language enthusiasts from around the world, enabling them to share resources, ask questions, and practice conversational skills in a supportive and interactive online environment. Moreover, language learning communities facilitate cross-cultural communication and friendship, allowing individuals to connect with speakers of different languages and explore diverse cultural perspectives.

**Conclusion.** In conclusion, the multilingual revolution propelled by modern technology represents a seismic shift in the way we approach language learning, translation, and communication in the 21st century. From the palm of our hands to the depths of cyberspace, technology has empowered individuals to embrace multilingualism as never before, breaking down linguistic barriers and fostering a more inclusive and interconnected global community.

As we reflect on the innovations and advancements discussed in this article, it becomes evident that the opportunities afforded by modern technology are boundless. Mobile language learning apps provide personalized and accessible language instruction, machine translation technologies enable seamless communication across linguistic divides, language teaching robots offer interactive and engaging language education experiences, voice recognition technology facilitates hands-free multilingual communication, and online language communities connect language enthusiasts from around the world, fostering cultural exchange and collaboration.

However, amidst the excitement and optimism surrounding the multilingual revolution, it is important to recognize the challenges and complexities that lie ahead. Technology alone cannot replace the rich tapestry of human interaction and cultural exchange that underpins true multilingualism. Moreover, issues such as digital divide, linguistic discrimination, and the erosion of linguistic diversity must be addressed to ensure that the benefits of modern technology are accessible to all. Nevertheless, the potential for positive impact is immense. By harnessing the power of modern technology, we have the opportunity to create a world where linguistic diversity is celebrated, communication barriers are dismantled, and cultural understanding flourishes. As we continue to embrace the multilingual revolution, let us remember that language is not merely a means of communication but a bridge that connects us all, uniting us in our shared humanity and collective aspirations for a brighter, more inclusive future.

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**ВПЛИВ СТРУКТУРИ ТА ТЕМПЕРАТУРИ ГАРТУВАННЯ НА МІЦНІСТЬ  
СТАЛІ НА ЗГИН**

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Дослідження впливу структури та температури гартування на міцність сталі на згин обумовлено широкою розповсюдженістю цієї схеми навантаження в реальних умовах експлуатації сталей. Іспит на згин проводили в умовах прикладання навантаження зосередженою силою на середину відстані між опорами. Випробування проводили на зразках з вуглецевої сталі діаметром 10 мм та довжиною 340 мм, на відстані між опорами 300 мм.

Вміст вуглецю, розмір зерна аустеніту, температура гартування та міцність при згинанні вуглецевих сталей після гартування в воду та відпуску при 150 °С протягом 1 години.