Preface

Special Issue on Up-to-date problems in modern railways and optimization in engineering structures

The current issue is the sixth part of the Special Issue series in Acta Polytechnica Hungarica, the scientific journal of the University of Óbuda. In the first five issues altogether, 79 papers are available; in the current issue, 20 papers have been published. The authors cover two continents, Europe and Asia, and more than fifteen different countries.

The sixth issue brings together research reflecting the increasingly multidisciplinary nature of modern railway engineering. As rail systems continue to expand and adapt to rising transportation needs, the papers emphasize the importance of understanding mechanical loads, improving structural resilience, managing risks, and applying intelligent technologies to support safe and sustainable operation. Several contributions explore how railway components and supporting structures behave under real operating conditions, guiding more accurate load evaluation and more durable substructure solutions. Other works highlight the growing role of systematic risk assessment, particularly for complex assets such as tunnels, where structured evaluation methods help prioritize maintenance and ensure operational safety.

Technological innovation also features prominently. Advances in wireless sensor networks demonstrate how energy-efficient data collection can support long-term monitoring across large and distributed railway systems. Complementing these developments, research on urban tramway infrastructure offers insights into the long-term evolution of track geometry, reinforcing the importance of measurement-based maintenance strategies in densely populated environments.

Together, the papers illustrate how modern railway research integrates engineering mechanics, material solutions, digital technologies, and infrastructure management. By combining these perspectives, the issue contributes to the broader goal of strengthening the performance, safety, and sustainability of rail transport in a rapidly changing operational landscape.

We express our sincere appreciation to all contributing authors for their outstanding work and for presenting their research to Acta Polytechnica Hungarica. The continuation of this Special Issue series has been made possible through the committed efforts of Anikó Szakál and Prof. Péter Baranyi, to whom we extend our heartfelt thanks. Further installments of the series are already in development, with upcoming volumes planned for future publication in Acta Polytechnica Hungarica.

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Guest Editors