

Journal of civil engineering and transport

2025
Volume 7
Issue 3



transEngin

ISSN 2658-1698

e-ISSN 2658-2120



CASIMIR PULASKI
RADOM UNIVERSITY

Casimir Pulaski Radom University

Journal of civil engineering and transport

 **transEngin**

ISSN 2658-1698

e-ISSN 2658-2120

Volume 7
Issue 3



**CASIMIR PULASKI
RADOM UNIVERSITY**

2025

Editorial Committee Contact

Journal of civil engineering and transport transEngin



Casimir Pulaski Radom University
Faculty of Transport, Electrical Engineering and Computer Science
ul. Malczewskiego 29
26-600 Radom
Poland
phone: (+48) 48 361-77-59
email: transengin@uthrad.pl
www.transengin.uniwersytetradom.pl

All articles are reviewed by two external reviewers. The list of reviewers is published in the current issue of the journal and on the website of the magazine.

CC BY-NC-ND

ISSN 2658-1698
e-ISSN 2658-2120

Copyright© 2025 by Publishing House Casimir Pulaski Radom University

All rights reserved. No part of this publication may be modified, reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing from publisher.

**Journal of civil engineering and transport
transEngin**

Editorial Board / Komitet Redakcyjny

Editor-in-Chief / Redaktor Naczelny

*Aldona Kuśmińska-Fijałkowska, DSc., PhD, BEng., Assoc. Prof.
Casimir Pulaski Radom University, Poland*

Associate Editors / Koordynatorzy Redakcyjni

*Renata Krajewska, PhD
Casimir Pulaski Radom University, Poland
Sylvia Olszańska-Wesoły, PhD, BEng.*

Section Editors / Redaktorzy Działów

Transport Infrastructure / Infrastruktura w Transporcie

*Tomasz Kamiński, DSc., PhD, BEng., Assoc. Prof.
ITS Poland Association (US/CA), Poland*

Transport Logistics / Logistyka w Transporcie

*Waldemar Nowakowski, DSc., PhD, BEng., Assoc. Prof.
Casimir Pulaski Radom University, Poland*

Transport Means / Środki Transportu

*Andrzej Krzyszkowski, DSc., PhD, BEng., Assoc. Prof.
Casimir Pulaski Radom University, Poland*

Traffic Control in Transport / Sterowanie Ruchem w Transporcie

*Mieczysław Kornaszewski, DSc., PhD, BEng., Assoc. Prof.
Casimir Pulaski Radom University, Poland*

Electromobility / Elektromobilność

*Jacek Kozyra, DSc., PhD, BEng., Assoc. Prof.
Casimir Pulaski Radom University, Poland*

Journal of civil engineering and transport transEngin

Scientific Board / Rada Naukowa

*prof. Zbigniew Łukasik - **chairman**, Casimir Pulaski University Radom, Poland*

prof. Aldona Kuśmińska-Fijałkowska, Casimir Pulaski University Radom, Poland

prof. Andrzej Lewiński, Casimir Pulaski University Radom, Poland

prof. Janusz Dyduch, Casimir Pulaski University Radom, Poland

prof. Tomasz Perzyński, Casimir Pulaski University Radom, Poland

prof. Jerzy Wojciechowski, Casimir Pulaski University Radom, Poland

prof. Tomasz Ciszewski, Casimir Pulaski University Radom, Poland

prof. Marianna Jacyna, Warsaw University of Technology, Poland

prof. Anna Stelmach, Warsaw University of Technology, Poland

prof. Gabriel Nowacki, Military University of Technology, Poland

prof. Jerzy Merkisz, Poznan University of Technology, Poland

prof. Wojciech Ślęczka, Maritime University of Szczecin, Poland

prof. Adam Weintrit, Gdynia Maritime University, Poland

prof. Jerzy Herdzik, Gdynia Maritime University, Poland

prof. Tomasz Kamiński, ITS Poland Association (US/CA), Poland

prof. Aleš Janota, University of Žilina, Slovakia

prof. Pavol Špánik, University of Žilina, Slovakia

prof. Anna Križanová, University of Žilina, Slovakia

prof. Juraj Grenčík, University of Žilina, Slovakia

prof. Algimantas Valinevicius, Kaunas University of Technology, Lithuania

prof. Vaidas Lukoševičius, Kaunas University of Technology, Lithuania

prof. Rolandas Makaras, Kaunas University of Technology, Lithuania

prof. Algimantas Fedaravičius, Kaunas University of Technology, Lithuania

prof. Gintautas Bureika, Vilnius Gediminas Technical University (VGTU), Lithuania

prof. Olegas Prentkovskis, Vilnius Gediminas Technical University (VGTU), Lithuania

prof. Edgar Sokolovskij, Vilnius Gediminas Technical University (VGTU), Lithuania

prof. Mareks Mezitis, Transport Academy, Riga, Latvia

prof. Aleksandr Grakovski, Transport and Telecommunication Institute, Riga, Latvia

prof. Vanja Ambrožič, University of Ljubljana, Slovenia

prof. Artur Kahramanian, Ukrainian State University of Railway Transport, Ukraine

prof. Jiří Stodola, University of Defence, Czech Republic

prof. Zdeněk Vintr, University of Defence, Czech Republic

prof. Jaromír Šíroký, University of Pardubice, Czech Republic

prof. Paulo M. S. T. de Castro, University of Porto, Portugal

Marketing Marketing / Marketing

Małgorzata Górską, PhD, BEng.

Casimir Pulaski Radom University, Poland

Layout design / Projekt graficzny

Mariusz Dański, DSc., PhD, Assoc. Prof.

Casimir Pulaski Radom University, Poland

DTP Operator / Operator DTP

Przemysław Rudzki, MSc, BEng.

Casimir Pulaski Radom University, Poland

Publishing House

Casimir Pulaski Radom University

ul. Młczewskiego 29

26-000 Radom

Poland

tel. (+48) 48 361-70-33

fax (+48) 48 361-70-34

e-mail: wydawnictwo@uthrad.pl

ISSN 2658-1698

e-ISSN 2658-2120

Issue I. Edition 50 copies.

Printing and binding: Printing department of the Casimir Pulaski Radom University

Contents / Spis treści

1. BOROWIAK Jacek	
Application of ABC and XYZ methods to inventory management in an automotive industry enterprise	141
<i>Zastosowanie metod ABC i XYZ do zarządzania zapasami w przedsiębiorstwie branży motoryzacyjnej</i>	
2. ROGOWSKI Andrzej	
Pedestrian safety in road traffic in Poland 2007-2024	151
<i>Bezpieczeństwo pieszych w ruchu drogowym w Polsce 2007-2024</i>	
3. KORNASZEWSKI Mieczysław, PAŚ Jacek	
The use of simulation experimental research in different areas concerning railway traffic control issues	183
<i>Wykorzystanie symulacyjnych badań eksperymentalnych w różnych obszarach dotyczących zagadnień sterowania ruchem kolejowym</i>	
4. CELIŃSKI Ireneusz, OPASIAK Tadeusz	
Measurement and analysis of pedestrian traffic characteristics in real time	199
<i>Pomiar i analizy charakterystyk ruchu pieszego w czasie rzeczywistym</i>	

**Journal of civil engineering and transport
transEngin**

Reviewers / Recenzenci

Prof. dr hab. inż. Adam Rosiński, Poland
dr hab. inż. Danuta Miedzińska, prof. WAT, Poland
dr hab. inż. Maria Cieśla, prof. PŚ, Poland
dr hab. inż. st. of. mech. Jerzy Herdzik, prof. GMU, Poland
dr hab. inż. Gabriel Nowacki, prof. WAT, Poland
doc. Ing. Juraj Grenčík, PhD., Assoc. prof., Slovakia
Prof. Ing. Aleš Janota, PhD. Eurlng, Slovakia

Notes / Notatki