



Petru Maior
UNIVERSITY
of
TÎRGU - MUREȘ

SCIENTIFIC
BULLETIN OF THE
“PETRU MAIOR”
UNIVERSITY OF
TÎRGU-MUREȘ

2018
Volume 15 (XXXII) – New Series
Number 1

Published by
“Petru Maior” University Press

ISSN-L 1841-9267 (Print)
ISSN 2285-438X (Online)
ISSN 2286-3184 (CD-ROM)

**SCIENTIFIC BULLETIN
OF THE
„PETRU MAIOR” UNIVERSITY OF TÎRGU MUREŞ**

EDITOR IN CHIEF

Liviu MOLDOVAN

„Petru Maior” University of Tîrgu Mureş - Romania

EDITORIAL BOARD

Ioan ABRUDAN

Osei ADJEI

Ketil ARNESEN

Dorin BICĂ

Csaba BLAGA

Vasile BOLOŞ

Nicolae CHIRILĂ

Lucian-Ionel CIOCA

Krzysztof DRACHAL

Adrian DUKA

Mircea DULĂU

Ejub DŽAFEROVIĆ

Călin ENĂCHESCU

Bela FINTA

Adrian GLIGOR

Maurice GRECH

Hanbey HAZAR

Khalil KHALILI

László KOVÁCS

Péter KÖRTESEI

Hasham A.E. MAGD

Liviu MASALAR

Vishnu Narayan MISHRA

Alexandru MORAR

Shadi ABDHAMID MUFTAH

Radu MUNTEANU

Abdelfatah NASRI

Stelian OLTEAN

Cengiz ONER

Elena PÉREZ-BERNABEU

Horia F. POP

Costache RUSU

Cenk SAYIN

Samuel SÁNCHEZ CABALLERO

Sathyayageeswaran SATHISH

Miguel Angel SELLÉS CANTÓ

Teodor SOCACIU

Ilyas SOMUNKIRAN

John B. STAV

Gabriela STRNAD

Technical University of Cluj Napoca - Romania

University of Bedfordshire - United Kingdom

Sør-Trøndelag University College - Norway

“Petru Maior” University of Tîrgu Mureş - Romania

University of Miskolc - Hungary

“Petru Maior” University of Tîrgu Mureş - Romania

“Petru Maior” University of Tîrgu Mureş - Romania

Lucian Blaga University of Sibiu - Romania

Warsaw University of Technology - Poland

“Petru Maior” University of Tîrgu Mureş - Romania

“Petru Maior” University of Tîrgu Mureş - Romania

University of Sarajevo - Bosnia and Herzegovina

“Petru Maior” University of Tîrgu Mureş - Romania

“Petru Maior” University of Tîrgu Mureş - Romania

Petru Maior” University of Tîrgu Mureş - Romania

Malta College of Arts, Science and Technology - Malta

Firat University - Turkey

University of Birjand - Iran

University of Miskolc - Hungary

University of Miskolc - Hungary

University of Buraimi - Sultanate of Oman

University of Liege - Belgium

Sardar Vallabhbhai National Institute of Technology, Surat - India

“Petru Maior” University of Tîrgu Mureş - Romania

Libyan Academy - Libya

Technical University of Cluj Napoca - Romania

University of Bechar - Algeria

“Petru Maior” University of Tîrgu Mureş - Romania

Firat University - Turkey

Politechnical University of València - Spain

Babeş Bolyai University of Cluj Napoca - Romania

Gh. Asachi Technical University of Iaşi - Romania

Marmara University - Turkey

Politechnic University of València - Spain

Aalim Muhammed Salegh College of Engineering - India

Politechnic University of València - Spain

“Petru Maior” University of Tîrgu Mureş - Romania

Firat University - Turkey

Sør-Trøndelag University College - Norway

“Petru Maior” University of Tîrgu Mureş - Romania

Desktop publishing:

Daniela MARCU

ISSN-L 1841-9267 (Print), ISSN 2285-438X (Online), ISSN 2286-3184 (CD-ROM)

„Petru Maior” University Press

e-mail: liviu.moldovan@ing.upm.ro

Str. Nicolae Iorga, nr. 1,

540088, Tîrgu Mureş, Romania

Tel/fax 0265-211838



“Petru Maior” University Press



ISSN-L 1841-9267 (Print)
ISSN 2285-438X (Online)
ISSN 2286-3184 (CD-ROM)