

Proceedings of the Conference Science in TEchnology

www.scinte.gr

SCiNTE 2015

November 5-7, 2015

Athens, Greece

Volume 1

- Topic A: Applied Mechanics, Civil and Energy Engineering
- Topic B: Earth and Environmental Sciences
- Topic C: Arts & Humanities

Organized by
Technological
Educational Institute
(TEI) of Athens



Supported by
Research Funding
Program
ARCHIMEDES III

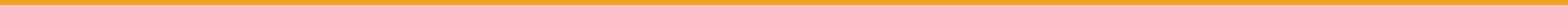


OPERATIONAL PROGRAMME
EDUCATION AND LIFELONG LEARNING
investing in knowledge society
MINISTRY OF EDUCATION & RELIGIOUS AFFAIRS
MANAGING AUTHORITY
Co-financed by Greece and the European Union



2015 SCinTE

Proceedings of the Conference "SCience in TEchnology"





Copyright 2015, by TEI of Athens

Copyright belongs to the Technological Educational Institute (TEI) of Athens. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Editors.

SCiTE²⁰¹⁵

Proceedings of the Conference “SCience in TEchnology”

Athens, Greece / November 5-7, 2015

Organized by
Technological
Educational Institute
(TEI) of Athens



Supported by
Research Funding
Program
ARCHIMEDES III



Co-financed by Greece and the European Union

Editor:

Dimos Triantis, Technological Educational Institute of Athens, Greece

Associate Editors:

Ioannis Kandarakis, Technological Educational Institute of Athens, Greece

Stavros Kourkoulis, National Technical University of Athens, Greece

Filippos Vallianatos, Technological Educational Institute of Crete, Greece

Bessie Argiropoulou, Technological Educational Institute of Athens, Greece

Ilias Stavrakas, Technological Educational Institute of Athens, Greece

International Scientific Committee**Applied Mechanics, Civil and Energy Engineering**

Zacharias Agioutantis, University of Kentucky, USA

Konstantinos Belibassakis, National Technical University of Athens, Greece

Harris Douglas, Heriot-Watt University, UK

Wolf Gerrit Fruh, Heriot-Watt University, UK

Ioannis Kaldelis, TEI of Piraeus, Greece

Dimitris Karalekas, University of Piraeus Greece

Kostas Karamanos, Technological Educational Institute of Athens, Greece

Tassos Karayiannis, Brunel University, UK

Antonios Kyriazopoulos, Technological Educational Institute of Athens, Greece

Eric Landis, University of Maine, USA

Georgios Livanos, Technological Educational Institute of Athens, Greece

Nikos Pnevmatikos, Technological Educational Institute of Athens, Greece

Costas Politis, Technological Educational Institute of Athens, Greece

Tian Tang, University of Alberta, Canada

Stavros Tsantzalis, University of Patras, Greece

Earth & Environmental Sciences

Marios Anagnostou, National Observatory of Athens, Greece

Torok Akos, Budapest University of Technology and Economics, Hungary

Seraphim Alvanides, Northumbria University, UK

Michele Campagna, Universita di Cagliari, Italy

Angelo De Santis, Istituto Nazionale di Geofisica e Vulcanologia, Italy

Georgia Fotopoulos, Queen's University, Canada

Antonios Giannopoulos, The University of Edinburgh, UK

Vassilios Karakostas, Aristotle University of Thessaloniki, Greece

Vincenzo Lapenna, Institute of Methodologies for Environmental Analysis, Italy

Wen Nie, Chengdu University of Technology, China

Vassilios Pagounis, Technological Educational Institute of Athens, Greece

Dimos Pantazis, Technological Educational Institute of Athens, Greece

Eleftheria Papadimitriou, Aristotle University of Thessaloniki, Greece

Stefan van der Spek, T.U.Delft, Nederland

Luciano Telesca, Institute of Methodologies for Environmental Analysis, Italy

Maria Tsakiri, National Technical University of Athens, Greece

Andreas Tsatsaris, Technological Educational Institute of Athens, Greece

Grigoris Tsokas, Aristotle University of Thessaloniki, Greece

Andreas Tzanis, National and Kapodistrian University of Athens, Greece

Arts & Humanities

Athina Alexopoulou, Technological Educational Institute of Athens, Greece

Nikitas Chiotinis, Technological Educational Institute of Athens, Greece

Christian Degriigny, Haute Ecole Arc Conservation-restauration, Switzerland

Andreas Karydas, Demokritos Institute of Nuclear Physics, Greece

Vasilios Lampropoulos, Technological Educational Institute of Athens, Greece

Ian D. MacLeod, Fremantle Museums & Maritime Heritage, Western Australian Maritime Museum, Australia

Paraskevi Pouli, Institute of Electronic Structure and Lasers, Greece

Wafaa El Saddik, Children's Alliance for Tradition and Social Engagement, Germany

Brian Singer, University of Northumbria at Newcastle, UK

Table of Contents

Topic A: Applied Mechanics, Civil and Energy Engineering	17
Pressure Stimulated Currents and Acoustic Emission combined recordings for the detection of compressive strength of Dionysos marble <i>I. Stavrakas, D. Triantis, A. Kyriazopoulos, K. Ninos</i>	19
Acoustic Emissions Experimental Technique used to verify Kaiser effect during compressional tests of Dionysos marble. <i>D. Triantis and I. Stavrakas</i>	23
Experimental evaluation of a retrofitted PV/T collector <i>Evangelos Sakellariou, Petros Axaopoulos</i>	27
An Internet-Accessible Experiment Using a Remote Photovoltaic Laboratory <i>Emmanouil D. Fylladitakis, Petros J. Axaopoulos, Michael Theodoridis And Konstantinos Moutsopoulos</i>	31
Determination of Fracture Loads for Mode I Fracture Toughness Calculations for CCNBD Marble Specimens by Acoustic Emission Signals <i>K. Kaklis, S. Mavrigiannakis, V. Saltas, A. Daskalaki, F. Vallianatos, Z. Agioutantis</i>	35
Evaluation of LNG Bunkering Concept for Greek Sea Territory <i>G.A. Livanos, S. Dimitrellou, E. Strantzali, G. Theotokatos</i>	40
Energy management in the domestic sector - Peculiarities and chances in the Greek case <i>John Gelegenis, George Mavrotas and George Giannakidis</i>	44
Ship Shape Optimization using a BEM-Isogeometric solver for wave resistance <i>K.V. Kostas, A.I. Ginnis, C.G. Politis and P.D. Kaklis</i>	48
Energy harvesting from sea waves and currents using oscillating hydrofoils <i>K. Belibassakis, T. Gerostathis, E. Filippas, J. Touboul and V. Rey</i>	54
Application of a 3D coupled-mode model to the hydroelastic analysis of very large floating bodies over inhomogeneous seabeds <i>Th.P. Gerostathis, K.A. Belibassakis and G.A. Athanassoulis</i>	58
Degradation effects in field-aged c-Si solar panels of a grid-tie photovoltaic plant <i>Konstantinos Gkarakis, Konstantinos Loukidis, Petros Axaopoulos</i>	63
Acoustic and electrical emissions from sandstone under uniaxial compression <i>V. Saltas, I. Fitis, J. P. Makris and F. Vallianatos</i>	67

The displacement field in a circular disc made of either orthotropic or transversely isotropic material under parabolic radial pressure <i>Christos F. Markides</i>	71
Rejoining fragmented elements of stone monuments: Critical aspects from the experience of the Athens Acropolis restoration project <i>Stavros K. Kourkoulis</i>	76
An experimental study of the pull-out mechanism of threaded metallic bars embedded in marble blocks <i>I. Dakanali, I. Stavrakas, D. Triantis, E.D.Pasiou, S.K. Kourkoulis</i>	81
Electrical and Acoustic Emissions during Three Point Bending Tests of Pre-Notched Marble Specimens <i>Ermioni D. Pasiou, Ilias Stavrakas, George Hloupis, Stavros K. Kourkoulis and Dimos Triantis</i>	86
Simple Probabilistic Slope Stability Analysis <i>Georgios Belokas</i>	91
Embodied energy and embodied CO2 of building constructive materials in a typical Hellenic dwelling <i>Georgios Syngros and Dimitrios Koubogiannis</i>	95
Comparison of different Air Conditioning Systems implemented in a typical office building in Greece <i>Ilia Lampro and Dimitrios Koubogiannis</i>	99
Optimal Flow Control of Laminar Vortex Shedding around a Cylinder <i>Ioannis Bonis, Haralambos Sarimveis and Dimitrios Koubogiannis</i>	104
Using b-value analysis to estimate pre-failure characteristics of cement mortar beams subjected to Three-Point-Bending <i>I. Dakanali, A. Kyriazopoulos, I. Stavrakas, D. Triantis</i>	109
Green Islands in Europe and Prospects for Greek Islands. The Tilos Project <i>J.K. Kaldellis, G. Salagiannis, N.C. Ili, P. Stinis, K. Dimakis</i>	113
Electromobility in EU: Current status and future prospects for the Greek market <i>J.K. Kaldellis, St. Liaros, G. Spyropoulos</i>	118
Application of recurrence quantification analysis in wind time series from wind farms <i>A.K. Charakopoulos, T.E. Karakasidis and I. Sarris</i>	124
Non-linear Time series Methods Applications on Transport Data <i>A.D.Fragkou, T.E. Karakasidis and E. Nathanail</i>	128

Effect of carbon nanotubes addition on the mechanical performance of co-polyimide hollow fiber membranes	
<i>Filippos D. Gegitsidis, Nikolaos D. Alexopoulos, Evangelos P. Favvas and Stavros K. Kourkoulis</i>	132
Corrosion-induced fracture toughness degradation of artificially aged 2024 aluminum alloy specimens	
<i>Paraskevi Liberaki, Nikolaos D. Alexopoulos, Constantinos I. Stergiou and Stavros K. Kourkoulis</i>	135
The impact of corrosion-induced micro-cracking on the structural integrity of ultra-thin sheets of aeronautical aluminum alloy 2024	
<i>Christina Margarita Charalampidou, Nikolaos D. Alexopoulos, Panagiotis Skarvelis, Charis Dalakouras and Stavros K. Kourkoulis</i>	138
Fracture toughness of electron beam welded specimens of aluminum alloy 6156	
<i>Theano Examilioti, Nikolaos D. Alexopoulos, George Stefanou, Vasilis Stergiou, Stavros K. Kourkoulis</i>	142
Polyvinyl alcohol - carbon nanotubes fiber as an embedded sensor in GFRP under bending loads	
<i>Panagiota Lymperta, Stavros K. Kourkoulis, Philippe Poulin and Nikolaos D. Alexopoulos</i>	144
The effect of graphene nanoplatelets addition on the mechanical performance of epoxy resin	
<i>Zafeiroula Paragkamian, Nikolaos D. Alexopoulos, Philippe Poulin and S. K. Kourkoulis</i>	148
Effect of prior solid solution heat treatment on the mechanical behavior of artificially aged aluminum alloy 2024 specimens	
<i>Antonios I. Pasoudis, Paraskevi Liberaki, Alexis Kermanidis and Nikolaos D. Alexopoulos</i>	150
Nano-additions of multiwall carbon nanotubes in white cement for restoration of monuments of Cultural Heritage	
<i>Zoi Metaxa, Spyridoula Boutsoukou, Stefanos Nitodas and Stavros K. Kourkoulis</i>	153
Hydroelastic analysis of VLFS elastically connected to the seabed in shallow wave conditions	
<i>E. Karperaki, K. A. Belibassakis, T. K. Papathanasiou and S. I. Markolefas</i>	156
Topic B: Earth & Environmental Sciences	161
Coastal Transport Integrated System (Co.Tr.I.S)	
<i>Dimos N. Pantazis, Panagiotis Stratakis, Vassilis Moussas, Elias Lazarou, Dimitris Stathakis, Eleni Gkadolou, Charalampos Karathanasis, Costas Politis, Anna Christina Daverona, Vassiliki Kyriakopoulou, Eleni Babalona, John Chrysoulakis, Maria Paralika, John Tyrinopoulos</i>	163

3D Heritage Recording using Terrestrial Laser Scanning Techniques <i>Vassilios D. Andritsanos, Michail Gianniou, Vassilios Pagounis, Maria Tsakiri</i>	167
A Shale Brittleness Index Based on Shale Peak Strength and Strain <i>Yanhu Tan, Fenglin Xu, Lin Chen, Qiao Chen, Linhong Zhu, Lisha Wang and Wen Nie</i>	171
Urban run-off management in a Greek coastal city: Citizens' awareness, attitudes and proposed solutions <i>Kalderis D., Stavroulakis G. and Diamadopoulou E.</i>	174
Forest fires: a phenomenon with serious environmental and other impacts <i>Georgia Tsakni</i>	178
Spatio-temporal cluster analysis of seismicity using a modified density-based clustering algorithm <i>Dionysios Mountakis</i>	181
Advances in Satellite Remote Sensing of major Natural, Environmental and Industrial Hazards <i>V. Tramutoli and N. Pergola</i>	185
A non-extensive statistical physics view in Earth Physics from laboratory to planetary scale: A review. <i>Filippos Vallianatos</i>	187
A Non Extensive Statistical Physics view on the spatiotemporal distribution of Earth's seismicity <i>Kalliopi Chochlaki, Filippos Valianatos and George Michas</i>	191
Paikon and Tzena terranes (Axios zone, Greece): Can they be correlated? <i>Katrivanos E., Kilias A. and Mountrakis D.</i>	195
Temporal Properties of Seismicity in the Corinth Rift: Are Earthquakes Random? <i>Georgios Michas, Filippos Vallianatos and Peter Sammonds</i>	199
The Hellenic Seismological Network of Crete (HSNC): Monitoring results and the new strong motion network <i>Georgios Chatzopoulos, Ilias Papadopoulos and Filippos Vallianatos</i>	203
Studying Lithosphere-Atmosphere-Ionosphere Coupling at the south front of the Hellenic Arc <i>John P. Makris, Bruno Zolesi, Massimo Chiappini, Filippos Vallianatos, Hercules Rigakis, Maxim Smirnov, Andreas Tzanis, Despina Kalisperi, Fragkiskos Pentaris, Vassileios Saltas, Ioannis Barbounakis, Ilias Papadopoulos, George Hloupis, Paolo Spalla, Adriano Nardi, Luca Spogli, Roberto Carluccio, Enrico Zuccheretti, Lucilla Alfonsi, Pantelis Soupios and Eleni Kokinou</i>	207

Spectral fractal analysis of MHz electromagnetic signals <i>Dimitrios Nikolopoulos, Petraki Ermioni, Cantzos Demetrios, Grigorios Coulouras and Constantinos Nomicos</i>	212
ImproDeProF Project: Recent Advances and New Challenges in the development of the DeProF tentative theory for steady-state two-phase flow in porous media <i>Marios S. Valavanides</i>	216
Microseismicity study in the area of Florina (Western Macedonia, Greece) <i>Mesimeri M., Karakostas V., Papadimitriou E. and Tsapanos T.</i>	220
Evidence of accelerating deformation prior to large earthquakes: a case study on the southern Hellenic Arc of Greece <i>G. Minadakis, G. Chatzopoulos and F. Vallianatos</i>	224
Aftershock statistics of large earthquakes in Greece <i>G. Minadakis, F. Vallianatos and I. Baskoutas</i>	229
Automatic Image Orientation for Accurate Texture Mapping of 3D City Models <i>L. Grammatikopoulos, I. Kalisperakis and E. Petsa</i>	234
Exploration of spatial variability of cycling in a British Urban Environment - Evidence from North East England <i>Seraphim Alvanides, Godwin Yeboah</i>	238
Stress and Moment Release Models for Seismic Hazard Assessment in Corinth Gulf <i>Mangira Ourania, Tsaklidis Georgios and Papadimitriou Eleftheria</i>	242
A MATLAB routine for earthquake epicentre determination using macroseismic data <i>Vasiliki Kouskouna and Georgios Sakkas</i>	246
A homogeneous Mw equivalent earthquake catalog for Greece 1990-2015 <i>Karakostas Vasileios, Papadimitriou Eleftheria and Mesimeri Maria</i>	250
“Earthshield”: An implementation for automatic macro-seismic calculations <i>P. Loumpardias, K. Chimos, T. Karvounidis, A. Ganas, C. Douligeris</i>	254
Small-world property and distinct evolution of complex networks at periods of main shocks from historical earthquake records in Greece <i>D. Chorozoglou, D. Kugiumtzis and E. Papadimitriou</i>	258
Design and Development of Embedded Systems for Precision Agriculture Applications: The Case of Monitoring <i>Dacus Oleae</i> Population and Bait Sprays <i>George N. Fouskitakis, Lefteris D. Doitsidis, Hercules Rigakis, Kyriaki Varikou, Ioannis Sarantopoulos</i>	263
Seismicity Memory Properties in Corinth Gulf (Greece) <i>Gkarlaouni Charikleia, Lasocki Stanislaw and Papadimitriou Eleftheria</i>	267

The joint modeling of earthquake time series using bivariate Poisson Hidden Markov Models	
<i>Katerina Orfanogiannaki and Dimitris Karlis</i>	272
An overview of landslide detection and monitoring using geodetic satellite observations	
<i>AC Peidou, G Fotopoulos</i>	276
Problems of Fracture Mechanics and Statistical Physics	
<i>Peter Sammonds and Clare Matthews</i>	280
Topic C: Arts & Humanities	283
Paradigm Shift in Innovative Design: Use of Form and Form of Use	
<i>Dr Athanasios Kouzelis, Professor</i>	284
Technology as a Creative Factor	
<i>Prof. Dr Tomas Kačerauskas</i>	289
Science and Technology in Archaeological Museums: The Re-Exhibition of the Archaeological Museum of Tegea	
<i>Gregory Grigorakakis, Panagiotis Ioannidis and Andreas Tsatsaris</i>	293
Oil paintings on paper support: Determination of condition criteria via non destructive testing and microanalysis	
<i>A. Alexopoulou, B. Singer, P. Banou, S. Zervos, A. Kaminari, A. Moutsatsou, A. Terlixi, E. Tziamourani, A. Karabotsos, M. Doulgeridis</i>	299
Swelling inhibition of clay-bearing building materials	
<i>N.A. Stefanis, M. Stefanidou, A. Kalagri, I. Karatasios, V. Kilikoglou, I. Papagianni and P. Theoulakis</i>	303
Testing composites for the in situ protection of wooden shipwrecks	
<i>Alexios-Nikolaos Stefanis and Anastasia Pournou</i>	306
Polypeptide models of keratin and collagen as a tool for the destruction of works of art	
<i>E. Fotou, E. Panou-Pomonis, E. Ioakeimoglou, E. Malea, G. Panagiaris and M. Sakarellos-Daitsiotis</i>	309
Assessing Environmental Effects on Organic Materials in Cultural Heritage: Chemical Deterioration of Artificially Aged Bone	
<i>Stamatis Boyatzis, Eleni Ioakimoglou, Yorgos Facorellis, ClioVossou, Maria Sakarellou, Eugenia Panou-Pomoni, Fotou Evmorfia, Efrosini Karantoni, Angelos G. Kalampounias, George A. Voyiatzis, Soghomon Boghosian, Jane Richter, Athanasios Karampotsos, Eleni Tziamourani and George Panagiaris</i>	312

Development of a standard laser technology for cleaning evidence of proteinaceous Cultural and Natural Heritage <i>Athanassia Papanikolaou, Kristallia Melessanaki, Alexandra Alexandropoulou, Konstantinos Giannaras, Athanasios Karambotsos, Effrosyni Karantoni, Ekaterini Malea, Stavroula Rapti, Nikolaos-Alexios Stefanis, Yorgos Facorellis, Stamatis Boyatzis, Paraskevi Pouli and George Panagiaris</i>	317
Removing iron corrosion products from museum artefacts: Investigating the effectiveness of innovative green chelators <i>Stavroula Rapti, Shayne Rivers and Anastasia Pournou</i>	322
On the role and significance of cultural heritage for a positive national identity Some educational remarks on museum education <i>Wafaa El Saddik</i>	325
Preliminary investigation of L-cysteine and mature tobacco as corrosion inhibitors for marine composite artefacts containing copper or iron alloys. <i>V. Argyropoulos, S.C. Boyatzis, M. Giannoulaki, A. Malea, A. Pournou, S. Rapti, A. Zacharopoulou, and Elodie Guilminot</i>	328
Experimental design of natural and accelerated bone and wood ageing (Project INVENVORG) <i>Y. Facorellis, A. Pournou, J. Richter, E. Karantoni, C. Vossou, N. Androutsopoulos and G. Panagiaris</i>	332
Bioart: Borders and definitions. Visitors' survey at Bioart exhibition <i>S.O. Papaioannou, E. Karantoni, Z. Tsourti, E. Kokkinidou, St. Drakos, N. Panourgia, V. Papakiriakou, G. Panagiaris, Th. Avaritsiotis</i>	337

Proceedings of the Conference Science in TEchnology

www.scinte.gr

2015 SCiNTE

November 5-7, 2015

Athens, Greece

Proceedings Volumes

○ Volume 1

- Applied Mechanics, Civil and Energy Engineering
- Earth and Environmental Sciences
- Arts & Humanities

○ Volume 2

- Materials & Micro-nano Technology
- Electrical Engineering, Computer Science & Telecommunications
- Learning/Teaching Methodologies and Assessment

○ Volume 3

- Physical and Mathematical Sciences
- Food Science and Technology
- Life and Health Sciences, Bioengineering

○ Volume 4

- Management Science, Finance, Economics & Tourism

Conference Chairs: Dimos Triantis, Ioannis Kandarakis

Organized by
Technological
Educational Institute
(TEI) of Athens



Supported by
Research Funding
Program
ARCHIMEDES III



MINISTRY OF EDUCATION & RELIGIOUS AFFAIRS
MANAGING AUTHORITY
Co-financed by Greece and the European Union