

SELDA (ALPAY) OTERKUS

Assistant Professor

Department of Naval Architecture, Ocean & Marine Engineering

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RESEARCH INTERESTS

Peridynamics, Fracture Mechanics, Multiphysics Analysis, Non-local Physics, Composite Materials, Fluid Structure Interaction, Finite Element Analysis, Vortex Element Method

EDUCATION

University of Arizona, Ph.D., Mechanical Engineering.

Izmir Institute of Technology, Turkey, M.Sc., Mechanical Engineering.

Dokuz Eylul University, Turkey, B.Sc., Mechanical Engineering.

EMPLOYMENT

Academic

Present

Assistant Professor, Department of Naval Architecture, Ocean & Marine Engineering, University of Strathclyde, Glasgow, UK

Visiting Professor, University of Padova, Italy

Past

Research/Teaching Assistant, Department of Aerospace and Mechanical Engineering, University of Arizona, Tucson, Arizona, USA

Research/Teaching Assistant, Department of Mechanical Engineering, Izmir Institute of Technology, Urla/Izmir, Turkey

ACADEMIC AWARDS and AFFILIATIONS

The 2009 AHS Arizona Chapter Vertical Flight Engineering Scholarship

University of Arizona, Graduate College Fellowship, 2007

Graduate Registration Scholarship from University of Arizona

Awarded as Research and Teaching Assistantship in the University of Arizona

Awarded as Research and Teaching Assistantship in Izmir Institute of Technology, Turkey

High honors in the Mechanical Engineering M.Sc. Program of Izmir Institute of Technology Turkey.

High honors in the Mechanical Engineering B.Sc. Program of Dokuz Eylul University ,Turkey.

Dokuz Eylul University, Turkey, Department of Mechanical Engineering, Ranked 10th amongst 163 students.

Dokuz Eylul University, Turkey, Scholarship award from the President of Dokuz Eylul University for two years.

Fatih High School, Turkey, Scholarship award at high school for one year.

PUBLICATIONS

Refereed Articles

[1] Madenci E. and **Oterkus S.** "Ordinary state-based peridynamics for plastic deformation according to von Mises yield criteria with isotropic hardening." *Journal of the Mechanics and Physics of Solids* 86 (2016): 192-219.

[2] **Oterkus S.** and Madenci E., 2015, "Peridynamics for Anti-plane Shear and Torsional Deformations," submitted to *Journal of Mechanics of Materials and Structures*, Vol. 10 (2), pp. 167-193.

[3] Diyaroglu C., Oterkus E., **Oterkus S.** and Madenci E., 2015, "Peridynamics for Bending of Beams and Plates with Transverse Shear Deformation," *International Journal of Solids and Structures*, Vol. 69, pp. 152-168

[4] **Oterkus S.**, Madenci E. and Agwai A., 2014, "Fully Coupled Peridynamic Thermomechanics," *Journal of the Mechanics and Physics of Solids*, Vol. 64, pp. 1-23

[5] **Oterkus S.**, Madenci E. and Agwai A., 2014, "Peridynamic Thermal Diffusion," *Journal of Computational Physics*, Vol. 265, pp. 71-96

[6] **Alpay S.**, Bilir L., Ozdemir S. and Ozerdem B., 2005, "Wind Speed Time Series Characterization by Hilbert Transform," *International Journal of Energy Research*, Vol. 30, pp. 359-364

Articles in Turkish

[1] **Alpay, S.** and Ilken, Z., 2000, "Utilization of Downhole Heat Exchangers in Geothermal Energy," *Termodinamik, Journal of Heating, Cooling, Ventilation & Air Conditioning, Natural Gas*, Vol. 98, pp. 66-71.

Articles under review

[1] Diyaroglu, C., **Oterkus, S.**, E., Oterkus, Madenci, E., Han, S., and Hwang Y., "Peridynamics for direct solution of moisture concentration in electronic packages" submitted to *Microelectronics Reliability*

[2] Madenci E. and **Oterkus S.**, "Ordinary state-based peridynamic for viscoelastic deformation" submitted to *International Journal of Solids and Structures*

Abstracts- submitted

Oterkus, S and Madenci, E. (2016) "Peridynamic Modeling of Thermo-Oxidative Damage Evolution in a Composite Lamina" submitted to AIAA Conference, Texas

Abstracts- accepted

Wang, H., Oterkus, E. and **Oterkus, S.**, "Fracture Modelling of Marine Lithium-Ion Batteries by Using Peridynamics", *International Mechanical Engineering Congress & Exposition (IMECE)*, 2016

Vazic, B., Ji, X., **Oterkus, S.** and Oterkus, E., "Ice Fracture Modelling by Using Peridynamics", *International Mechanical Engineering Congress & Exposition (IMECE)*, 2016

Zhu, N., De Meo, D., Diyaroglu, C., Oterkus, E. and **Oterkus, S.**, "Fracture Modelling of Polycrystalline Materials by Using Peridynamics", *International Mechanical Engineering Congress & Exposition (IMECE)*, 2016

Book Chapters- will be published

[1] Madenci, E. and **Oterkus, S.** on Multiphysics Modeling by Using Peridynamics, *Handbook of Peridynamic Modeling*, Chapman and Hall/CRC

Articles under preparation

[1] **Oterkus S.**, and Madenci E "Peridynamic Modelling Fuel Pellet Cracking under Thermal Loading"

[2] **Oterkus S.**, Madenci E., and Oterkus E. "A New Fully Coupled Bond Based Poroelastic Peridynamic Formulation for Fluid-Filled Fractures"

[3] **Oterkus, S.**, Madenci, E., Diyaroglu, C., Oterkus, E., Hwang Y., Bae, J. and Han, S., "Hygro-Thermo-Mechanical Analysis and Failure Prediction in Electronic Packages by Using Peridynamics,"

[4] Diyaroglu, C., **Oterkus, S.**, Madenci, E., Oterkus, E., and Han, S. W., "Peridynamic diffusion modelling by using finite element analysis,"

[5] Amirafshari, P., Barltop, N. Wright, M., Bharadwaj, U., **Oterkus, S.** "A review of NDE Methods for New-Built Ships Undergoing Class Inspections"

Book chapters

[1] Oterkus, E., Diyaroglu, C., Zhu, N., **Oterkus, S.** and Madenci, E., 2015, "Utilization of Peridynamic Theory for Modeling at the Nano-scale," *Nanopackaging: from Nanomaterials to The Atomic Scale*, Joachim, C., Poupon, G. and Baillin, X., editors, pp. 1-16, Springer.

[2] Madenci, E. and **Oterkus, S.** (2015) "Peridynamics for Coupled Field Equations", Handbook of Peridynamics Edited by F. Bobaru, J.T. Foster, P. Guebelle, S.A. Silling. Taylor & Francis/CRC Press. Expected Publication:2016 - submitted.

Conference Proceedings and Presentations

[1] Han, S. W., Diyaroglu, C., **Oterkus, S.**, Madenci, E., Oterkus, E., Hwang, Y. and Bae, J., 2016, "Peridynamic Direct Concentration Approach by Using ANSYS," 66th Electronic Components & Technology Conference, Las Vegas, Nevada, USA.

[2] **Oterkus, S.** and Madenci, E., 2015, "Peridynamics for Fully Coupled Fluid Flow and Deformation Fields in a Porous Medium" ASME 2015 International Mechanical Engineering Congress & Exposition, Houston, TX, USA.

[3] Madenci, E. and **Oterkus, S.**, 2015, "Peridynamics for Modeling Crack Formation and Growth in Nuclear Fuel Pellets" USNCCM Conference, San Diego, CA, USA.

[4] Han, S., Lim, S., Bae, J., Hwang, Y., Lee, S., **Oterkus, S.**, Madenci, E., Diyaroglu, C. and Oterkus, E., 2015, "Equivalent Acceleration Assessment of JEDEC Moisture Sensitivity Levels Using Peridynamics," 65th Electronic Components & Technology Conference, San Diego, California, USA.

- [5] Madenci, E. and **Oterkus, S.**, 2014, “Peridynamics for Stress and Strain Fields”, Society of Engineering Science 51st Annual Technical Meeting, 1-3 Oct 2014, West Lafayette, IN
- [6] **Oterkus, S.**, Madenci, E. and Oterkus, E., 2014, “Hydraulic Fracturing Simulation by using Peridynamics”, 1st International Symposium on Energy Challenges and Mechanics, 8-10 July 2014, Aberdeen, Scotland, UK.
- [7] Oterkus, E., Madenci, E. and **Oterkus, S.**, 2014, “Peridynamic Modeling of Structures Subjected to Shock Loading,” *Design and Protection Technologies for Land and Amphibious NATO Vehicles*, Specialists’ Meeting, Copenhagen, Denmark.
- [8] **Oterkus, S.**, Madenci, E. and Oterkus, E., 2014, “Peridynamic Modelling of Hydraulic Fracturing,” *USNCTAM2014*, East Lansing, MI, USA.
- [9] Madenci, E., **Oterkus, S.** and Barut, A., 2014, “Peridynamic J-2 Flow Theory with Isotropic Hardening,” *USNCTAM2014*, East Lansing, MI, USA.
- [10] **Oterkus, S.**, Madenci, E., Oterkus, E., Hwang, Y., Bae, J. and Han, S., 2014, “Hygro-Thermo-Mechanical Analysis and Failure Prediction in Electronic Packages by Using Peridynamics” *ECTC 2014*, Lake Buena Vista, FL, USA.
- [11] **Oterkus, S.** and Madenci, E., 2014, “Peridynamics for Fully Coupled Thermomechanical Analysis of Fiber Reinforced Laminates,” *55th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference*, National Harbor, Maryland, Paper No. AIAA 2014-0694
- [12] **Oterkus, S.** and Madenci, E., 2013, “Peridynamics for Anti-plane Shear and Torsional Deformations” *USNCCM Conference*, Raleigh, NC, USA.
- [13] Oterkus, E., Diyaroglu, C., **Oterkus, S.** and Madenci, E., 2013, “Peridynamic Formulation for Beam and Shell Type Structures” *USNCCM Conference*, Raleigh, NC, USA.
- [14] Oterkus, E., Zhu, N., **Oterkus, S.** and Madenci, E., 2013, “Utilization of Peridynamic Theory for Modeling at The Nano-scale” Nanopackaging Workshop, Grenoble, France.
- [15] Oterkus, E., **Oterkus, S.** and Madenci, E., 2013, “Overview of Peridynamic Theory: Past and Present” *IWPMEOWorkshop*, Antalya, Turkey.
- [16] **Alpay, S.**, and Madenci, E., 2013, “Crack Growth Prediction in Fully-Coupled Thermal and Deformation Fields Using Peridynamic Theory” *54th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Boston, MA, Paper No.2013-1477.

[17] **Oterkus, S.**, Fox, J., and Madenci, E., 2013, "Simulation of Electro-migration through Peridynamics," *Proceedings of the 63th Electronic Components & Technology Conference*, Las Vegas, NV.

[18] Madenci, E. and **Oterkus, S.**, 2013, "Peridynamic Theory Fully-Coupled Thermal and Deformation Field" Workshop on Nonlocal Damage and Failure: Peridynamics and Other Nonlocal Models, San Antonio, TX.

[19] **Alpay, S.**, Barut, A. and Madenci, E., 2010, "An Efficient Modeling Approach for Dynamic Simulation of Wind Turbine Blades" 51st *AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Orlando, FL, Paper No.2010-2739.

[20] **Alpay, S.**, Barut, A., Madenci, E. and Tessler, A., 2010, "A Robust Shell Element with Consistent In-Plane and Transverse Bending Deformations for Analyzing Stiffened Structures" 51st *AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Orlando, FL, Paper No.2010-2929.

[21] **Alpay S.**, Ozerdem B. and Ilken Z., 2005, "CFD Modelling of a Draught Diverter Used in Domestic Water Heating Appliance", 14th *Conference on Thermal Engineering and Thermogrammetry*, June 2005, Budapest, Hungary.

[22] **Alpay S.**, Ilken Z. and Ozdemir S., 2005, "Numerical Analysis of Finned type Downhole Heat Exchangers", 1st *International Symposium & Exhibition on Environment-Friendly Energy Sources and Technologies*, İzmir, Turkey.

[23] **Alpay S.**, Bilir L., Ozdemir S. and Özerdem B. 2004, " Estimation of Wind Speed in Urla District Via Hilbert Transforms", *CMES-04*, Cappadocia, Turkey.

[24] Bilir L., **Alpay S.** and Ozdemir S., 2004, "Study of Population of Heterogeneous Individuals", 4th *Int. Symposium on Intelligent Manufacturing Systems*, Sakarya, Turkey.

Book contributions

[1] Jeothermal Enerji Doğrudan Kullanım ve Tasarım El Kitabı, MMO Yayın No: MMO/2004/360 (2 chapters Translated from English to Turkish)

[2] Madenci,E and Oterkus E. Peridynamic Theory and its Applications, 2014, Springer

SEMINARS

[1] **Oterkus, S** "Peridynamics for Coupled Field Equations of Multiphysics", Aerospace and Mechanical Engineering Seminar, University of Arizona, October 16, 2014.

[2] **Oterkus, S** “Solution to Multiphysics Problems in Peridynamic Framework”, Research Seminar, University of Strathclyde, May 9, 2014.

Invited Talk

[1] **Oterkus, S** “Peridynamics for Heat Transfer Problems”, University of Arizona, 2016

[2] **Oterkus, S** “Peridynamics for Coupled Field Problems”, University of Arizona, 2016

[3] **Oterkus, S** “Peridynamics for Multiphysics Applications”, University of Strathclyde, 2016

Journal Review

Journal of Ocean Engineering (3 times)

Membership of Professional Bodies

ASME - “The American Society of Mechanical Engineers”

FUNDED RESEARCH PROJECTS

[1] “Cold Forming Modelling by Using Peridynamics” Advanced Manufacturing Research Center (AFRC) Route to Impact Funding, Dr. Selda Oterkus (PI) (£5,000)

[2] “Peridynamic Modeling of Fire Damage Prediction in Marine Composites” Engineering the Future (ETF) Studentships – Allocated Funding for Yan Gao, Total: £51,000 (University of Strathclyde) (3 years), Selda Oterkus (Supervisor)

[3] “Assessment of Strain Effects in Pipeline Dents” Strathclyde Research Studentship Scheme (SRSS) funded studentship, Total: £56,675 (University of Strathclyde) (3 years), Julia Race (Supervisor), Selda Oterkus (Co-Supervisor)

PENDING RESEARCH PROPOSALS

[1] “Virtual Centre for Durability Evaluation of Sustainable Materials in Atlantic Marine Environment”, Selda Oterkus (PI), Erkan Oterkus, Julia Race (3years, 2017-2019) Estimated budget 2,361,448 Euros

Internal Appointments

University of Strathclyde - Naval Architecture, Ocean & Marine Engineering Department Representative for Faculty Learning and Teaching Forum – since 2015

University of Strathclyde - Naval Architecture, Ocean & Marine Engineering Department for Faculty Online Teaching & Learning Group – since 2016

University of Strathclyde - Informal Faculty of Engineering mentor as part of Faculty of Engineering Women in Science and Engineering (WISE) activity

External Appointments

Marine Technology Education Consortium (MTEC) Second Marker – Jonathan Cutajar
“The Effects of Pitting Corrosion on Aluminum Hull Plating and Possible Mitigating Actions”

PhD Update Meeting for Peyman Amirafshari – The Welding Institute (TWI), Cambridge

COMPUTER SKILLS

Windows Office Programs (Word, Excel, Power Point), ANSYS, FLUENT, GAMBIT, Matlab, Fortran, Quick Basic.

SERVICE

Organizing committee member of the *Impression of European Summer School on Geothermal Energy Applications (ESGEA), Oradea, Romania, Balçova Thermal Hotel, Izmir, 6 July 2001.*

Organizing committee member of the "*Summer Course on Renewable Energy Resources,*" by Lutz Giese, GFZ- Postdam, Izmir Institute of Technology, 4-12 September 2000.

Organizing committee member of the "*Matlab Workshop*" by Charles T. Young, Assoc. Prof. of Geophysical Engineering Department at Michigan Technological University, Izmir Institute of Technology, 26-29 July 2005.

TEACHING EXPERIENCE

University of Strathclyde

NM210 – Analysis and Design of Marine Structures 1

NM312 – Analysis and Design of Marine Structures 2

NM979 – Computational Modelling of Problems in Structural Mechanics

University of Arizona

AME 301 Engineering Analysis
AME 302 Numerical Methods
AME 324L Mechanics of Materials Lab

Izmir Institute of Technology, Turkey

CS 101 Basic Information Technology
CHE 222 Fluid Mechanics
ME 202 Fluid Mechanics I
ME 303 Fluid Mechanics II
ME 343 Numerical Methods in Engineering
ME 340 Heat Transfer
ME 422 Building Heating Systems: Fundamentals and Design

Current PhD Students as a first supervisor:

Yan Gao “Peridynamic Modelling of Fire Damage Prediction in Marine Composites”

Current PhD Students as a second supervisor:

Xu Ji “Modelling and analysis of ice-induced vibrations of arctic offshore structures”

Luigi Russo “Peridynamic modelling of initialization and propagation of cracks in photovoltaic modules”

Current EngD Students as a second supervisor:

David Young “Discrete Cable Monitoring System” – Industrial Doctorate Centre for Offshore Renewable Energy (IDCORE)

Current MSc Students as a supervisor:

Zongda Zhang “Stress Analysis for Floating Structures in Wave Condition”

Declan MacDonald “Finite element analysis of a conventional drilling system and through tubing rotary device”

Jordan Christie “Finite Element Modelling of Collision and Grounding of ships”

Mark Obogo “Finite Element Analysis of the effect of high frequency vibration on submerged plates in deep and ultra-deep marine environments”

Sayyoon Park “Risk assessment and structural verification in explosion condition”

Current BSc Students as a supervisor:

Mark Meahan “Analysis of Ultra Deep-Water Mooring Systems for Offshore Structures”

Hamish Forsythe “The Effects of Non-linear Ice Damping on an Extended Matlock Model”

Andrzej Czerwonka “Finite Element Analysis of accidental ship ice collision”

Current MEng group project students as a supervisor:

Samuel Hives, Findlay Ralley, Ben Smith, Emma Harley and Alistair Galbraith
“New Generation Wind Turbine Transportation and Installation Vessel”

Current Internship students as a supervisor:

Pierre Ory “Fatigue Modelling of Wind Turbines by Using Fast Software”- From ENSTA ParisTech Universite, Paris-Saclay

Jeremy Parize “In-depth Investigation of FAST Software”- From SeaTech Engineering School ,Toulon

BEng and MEng Students as a Personal Development Advisor

Curtis Jordan
Dionysiou Kritonas
Doherty Darren
Drummond Jan
Dunnachie Ellis
Gratsos Kimon-Alexandros
Haggerty Samuel James Stewart
Hastie Craig
Heron Luisa
Sykes Victoria
Taylor-Barnes Rebecca Anne
Torres Martinez Juan Pablo
Valchev Iliya Krasimirov
Lavelle Thomas

Visiting Researcher:

Ping Xiang –from City University of Hong Kong - 2015
Expertise in meshfree multiscale model for the modeling of microtubules and nanotubes by using atomistic simulation and continuum mechanical modeling

LEADERSHIP EXPERIENCE

Turkish Student Association at the University of Arizona -Vice President, Fall 2008 - 2011

Teaching and Learning Representative of the Naval Architecture, Ocean & Marine Engineering Department, 2015-2016

Faculty Online Teaching & Learning Group Representative of the Naval Architecture, Ocean & Marine Engineering Department, 2016

INTERNSHIPS

Ahmet Yar Refrigerating *Industry Company*, Pınarbaşı, Izmir, Turkey.
Organization Intern, August 1998.

TEBA Ente Company, Torbalı, Izmir, Turkey.
Production Intern, August 1997.

Mithatpaşa Vocational School of Industry, Konak, Izmir, Turkey.
Production Intern, July 1996

CERTIFICATES

Summer Course on Renewable Energy Resources, by Lutz Giese, GFZ- Postdam, IZTECH Campus (4-12 September 2000) (Certificate).

European Summer School on Geothermal Energy Applications (ESGEA), Oradea, Romania, 26 April-05 May 2001, (Certificate of Attendance).

Direct Heating Systems with Geothermal Energy: Basics and Design: Course of National HVAC and Sanitary Convention and Exhibition, Izmir, Turkey 8–11 October 2003, (Certificate of Attendance).

First Graduate Poster Competition of Izmir Institute of Technology, Izmir, 19 December 2003 (Certificate of Participation).

Exergy and its Applications, conducted by Ebiltem, Ege University, Bornova, Izmir, Turkey, 26-27 July 2004, (Certificate of Attendance).

TECHNICAL EXCURSIONS

Technical excursion for main geothermal fields under exploration and utilization in Oradea, Romania. Organized by International Geothermal Training Center of the University of Oradea. May 2001.

Technical excursion for Balçova – Narlıdere District Heating Systems in Izmir, Turkey. Organized by Department of Mechanical Engineering, Izmir Institute of Technology. April 2001.

Geothermal Power Plant in Kizildere, Denizli, Turkey. Organized by the Geothermal Energy Research Development Test and Education Center, Izmir, March, 2002.

PROFESSIONAL MEMBERSHIPS

AHS International the Vertical Flight Society, 2010.

Turkish Chamber of Mechanical Engineers, Izmir, since March 2001.

Izmir Institute of Technology Geothermal Research & Education Centre (GEOCEN), Turkey, 2001-2006.