

Dr. Savas Dilibal

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RESEARCH INTEREST

Systematic investigation on manufacturing, processing, position & force controlled application and modeling of shape memory alloy (SMA) based actuation systems. Designing smart mechatronics products (solid state actuator and sensor systems) in different fields, such as robotics, biomedical and biomechatronics using NiTi based shape memory alloys.

EDUCATION

Doctor of Philosophy, Metallurgical and Materials Engineering

Yildiz Technical University, Istanbul, Turkey

Graduation: Dec 2005

Master of Engineering, Mechanical Engineering

Istanbul Technical University, Istanbul, Turkey

Graduation: June 2003

Bachelors of Engineering, System Engineering

Army Military Academy, Ankara, Turkey

Graduation: Aug 1995

WORK EXPERIENCE

- *Adjunct Professor, Mechanical Engineering Department, Akron University, Akron, OH* Jan 2014 - June 2014
 - Courses Taught:
ME 4900- 420 “Object-oriented Design”, (Course content: The course provides the most advanced portion of the systems component of the Aerospace Systems Engineering program. It provides a baseline for engineering practice on aerospace material selection following the co-op experience using C# programming)
- *Post-doctoral Research Associate, University of Akron, Akron, OH* Jan 2014 - June 2014
NiTi shape memory alloys based solid-state actuators (Experimental investigation on bio-inspired robotics finger, hand and gripper mechanisms and their controlling modes)
- *Post-doctoral Research Associate, University of Akron, Akron, OH & NASA GRC (Advanced Metallic Branch)* Jan 2013 - Jan 2014
Experiment, modeling and applications of NiTi and NiTiHf shape memory alloys
NASA funded project (NASA's Subsonic Fixed Wing Program - NNX11AI57A)
- *Post-doctoral Research Associate, University of Illinois at Urbana-Champaign, IL* Sept 2009 - Aug 2010
Macro and mesoscale thermomechanical behavior of NiTi, CoNiAl and NiMnGa alloys
- *Adjunct Professor, Mechanical Engineering Department, Yeditepe University, Istanbul* Sept 2007 - Sept 2009
 - Courses Taught:
ME 361 “Engineering Materials”, (Course content: Production, processing and heat treatment of steel, aluminum, magnesium, titanium and nickel alloys, temperature-time-transformation diagrams, Metals in biomedical applications, Ceramic materials, Polymeric materials, Composite materials)

ME 492 “SMA based robotic actuator system” Senior Mechanical Eng. Design Project

- *Logistics/Artillery Officer (NATO, Turkey)* Aug 1995 - Dec 2012
 - As a system engineer, functioned in multiple national and NATO-led multinational Headquarters conducting procurement, supply and contracting processes for Peace Support Exercises and Operations at tactical & operative levels.

COMPUTER SKILL

Finite Element Analysis : ABAQUS® (CAE®/Standard/Explicit) Linear & non-linear, Static & dynamic analyses, UMAT

Object-oriented Programming : C# Microsoft Visual Studio

Mathematical Data Analysis Tools : Mathematica, MATLAB®, MS - Excel

JOURNAL PUBLICATIONS

1. **Dilibal S., Engeberg E (2014)** "Novel manipulator driven by antagonistic nickel-titanium shape memory alloy actuators" *Sensors & Actuators A* (Submitted).
2. **Dilibal, S.** Lanba A., Saleeb A.F., Hamilton R.F., and Dhakal B. **(2014)** "Investigation of the role of control modes during uniaxial cyclic deformation of Ni-rich NiTi shape memory alloys: Part I - experimental investigation" *Experimental Mechanics* (in Review).
3. Saleeb A.F., Dhakal B., **Dilibal S.**, Padula II S. A. **(2014)** "On the modeling of the thermo-mechanical responses of four different classes of NiTi-based shape memory materials using a general multi-mechanism framework" *Mechanics of Materials*, Volume 80, Part A, Pages 67–86.
4. **Dilibal S. (2013)** "Investigation of Nucleation and Growth of Detwinning Mechanism in Martensitic Single Crystal NiTi Using Digital Image Correlation", *Metallography, Microstructure, and Analysis*, 2,4, 242-248.
5. **Dilibal S.,** Sehitoglu H., Hamilton R., Maier H.J., Chumlyakov Y. **(2011)** "On the Volume Change in Co-Ni-Al during Pseudoelasticity", *Materials Science and Engineering A*, 528,6, 2875-2881.
6. Hamilton, R.F., **Dilibal, S.**, Sehitoglu, H., Maier, H.J. **(2011)** "Underlying Mechanism of Dual Hysteresis in NiMnGa single crystals", *Materials Science and Engineering: A*, 528, 3, 1877-1881.
7. **Dilibal S.,** Tabanlı M, Dikicioğlu A. **(2004)** "Development of shape memory actuated ITU Robot Hand and its mine clearance compatibility", *Journal of Materials Processing Technology*, 1390-1394.
8. **Dilibal S.,** Güner E., Akturk N. **(2002)** "Three-finger SMA Robot Hand and Its Practical Analysis", *Robotica Journal*, 20,175-180.

CONFERENCES

1. **S. Dilibal,** A. F. Saleeb, B. Dhakal, A.E. Hurley, J. S. Owusu-Danquah, S. A. Padula II, R. D. Noebe and G. S. Bigelow **(2013)** "Characterization Capabilities of a 3D Multi-mechanism Material Model for the Prediction of the Thermo-mechanical Behavior of Different Classes of Shape Memory Materials", *ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, September 16-18, 2013 in Snowbird, Utah, USA (Symposium 2 on Mechanics and Behavior of Active Materials).

2. J.S. Owusu-Danquah, A. F. Saleeb, B. Dhakal, A.E. Hurley , **S. Dilibal**, S. A. Padula II, R. D. Noebe, and G. S. Bigelow (2013) “Large-scale Simulation of a Torque-Tube Actuator Using a 3D Multi-mechanism Material Model: A Comparative Study with $\text{Ni}_{49.9}\text{Ti}_{50.1}$ and $\text{Ni}_{50.3}\text{Ti}_{29.7}\text{Hf}_{20}$ Shape Memory Alloys”, ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, September 16-18, 2013 in Snowbird, Utah, USA (Symposium 2 on Mechanics and Behavior of Active Materials).
3. A.E. Hurley, A. F. Saleeb, **S. Dilibal**, B. Dhakal, J.S. Owusu-Danquah, and S. A. Padula II (2013) “Finite Element Modeling of NiTi Shape Memory Alloy Stents and Bone Staples for Biomedical Applications”, ASME 2013 Conference on Smart Materials, Adaptive Structures and Intelligent Systems, September 16-18, 2013 in Snowbird, Utah, USA (Symposium 2 on Mechanics and Behavior of Active Materials).
4. **S. Dilibal**, H. Sehitoglu, R. Hamilton, H.J.Maier, Y. Chumlyakov (2010) “Detwinning on NiTi SMAs” June 20-24, 2010, Special Workshop on Shape Memory Alloy, Koc University, Istanbul.
5. **S. Dilibal**, N. Cansever (2008) “Material characterization of the manufactured NiTi SMAs”, The International Conference for Shape Memory and Superelastic Technologies (SMST), 21-25 Sept., Stresa, Italy.

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

1. Member, American Society of Mechanical Engineers (ASME)
2. Member, The Minerals, Metals and Materials Society (TMS)

PATENT ISSUED

1. Antagonistic Shape Memory Actuators (4/10/2014 - USPTO: 61/977,822)
2. Key and safe padlock system using nickel-titanium shape memory alloys (TR 2008 02546 B)

REFERENCES

Dr. Erik D. Engeberg

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