Tal Cohen

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Department of Mechanical Engineering, Massachusetts Institute of Technology (joint)
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Education

2010 – 2013	*Technion I.I.T., Haifa, Israel* Thesis: Cavitation and Shocks in Porous Plasticity.	Ph.D. Aerospace Engineering Advisor: David Durban
2007 – 2010	*Technion I.I.T., Haifa, Israel* Thesis: Constitutive Aspects of Static and Dynamic Cavitation in Elastoplastic Solids. Graduated Summa Cum Laude	M.Sc. Aerospace Engineering Advisor: David Durban
2003 – 2007	*Technion I.I.T., Haifa, Israel* Graduated Cum Laude	B.Sc. Aerospace Engineering

Academic Appointments

2016 – present *Massachusetts Institute of Technology*
Assistant Professor, Civil & Environmental Engineering

2017 – present *Massachusetts Institute of Technology*
Assistant Professor, Mechanical Engineering (Joint)

2015 – 2016 *Harvard University*
Postdoctoral Fellow at the School of Engineering and Applied Sciences
Under the joint mentoring of Professors L. Mahadevan and K. Bertoldi.

2014 – 2015 *Massachusetts Institute of Technology*
Postdoctoral Fellow at the Department of Mechanical Engineering
A two year period through the MIT-Technion Post-Doctoral Program under the mentoring of Professor R. Abeyaratne.

Teaching

2017 Lecturer at MIT:
- Structural Dynamics (1.058, 1.158, 2.060, 2.06, 16.221)
- Introduction to Civil and Environmental Engineering Design (1.101)

2014 Teaching Certificate from the MIT Teaching Certificate Program.

2007 – 2013 Teaching Assistant at the Faculty of Aerospace Engineering, Technion. Headed classes of 15–100 students in a lead instructor role. Received award for excellence in teaching (Dynamics).
Courses taught: Dynamics, Flight Mechanics 2, Fundamentals of Aerospace, Structures, Theory of Elasticity

2003 – 2006 Instructor at the Division for the Advancement of students, Technion. Teaching core undergraduate courses (Calculus, Physics) to students from underprivileged socioeconomic backgrounds. Classes of 15-20 students and one-on-one sessions. Student assessments (5/5).

Research Interests

Continuum mechanics, extreme loading of solids, nonlinear material response, material growth, plasticity, material porosity, viscoelasticity, solid instabilities, cavitation phenomena, shock wave propagation.

Honors and Awards

2014 Postdoctoral fellowship for outstanding woman, awarded by the Planning and Budgeting Committee of the Ministry of Education in Israel
2014 MIT - Technion Post-Doctoral Fellowship
2013 Postdoctoral fellowship for outstanding woman, awarded by the Planning and Budgeting Committee of the Ministry of Education in Israel
2013 Technion - Best poster award in faculty Research Day, Technion
2013 MIT - Technion Post-Doctoral Fellowship
2013 Libai prize for excellence in studies in the field of aerospace structures
2013 Gutwirth Scholarship for excellence in studies towards Ph.D
2012 Zonta International Amelia Earhart Fellowship
2011 Zonta International Amelia Earhart Fellowship
2011 Hillel Prize for excellence in studies towards Ph.D
2010 Professor Arnan Saginer Award for Excellence in Studies
2009 Vivian Konigsberg Award for Excellence in Teaching
2007 Technion excellence award for graduate students
2006 Excellence in studies award from The Civil Center for Culture, Society and Economy
2005 Yael Rom Studies Award for Women in Aerospace Engineering

Invited Talks

"Mechanics of Squishy Things that can Grow", Invited talk at the ENAC Research Day, EPFL, Lausanne Switzerland (May 2017)

"Instability and Growth in Soft and Biological Materials", Invited talk at the MIT Biophysics retreat, Falmouth, MA (September 2016)

"Instability and Growth in Soft and Biological Materials", Invited Seminar at the Department of Industrial and Mechanical Engineering, Northeaster University, Boston, MA (March 2016)

"Instability and Growth in Soft and Biological Materials", Invited Seminar at the Department of Civil and Environmental Engineering, MIT, Cambridge, MA (March 2016)

"Instability and Growth in Soft and Biological Materials", Invited Seminar at the Faculty of Mechanical Engineering, Technion, Haifa, Israel (January 2016)

"Mechanics of Squishy Materials", Invited Seminar at the Department of Mechanical Engineering, Ben-Gurion University of the Negev, Beersheba, Israel (December 2015)

"Mechanics of Squishy Materials", Invited Seminar at the School of Mechanical Engineering, Tel-Aviv University, Israel (December 2015)

"Mechanics of Squishy Materials", Invited Seminar at the Faculty of Aerospace Engineering, Technion, Haifa, Israel (November 2015)

"From Shock Waves and Cavitation to Surface Growth and Coupled Diffusion", Invited for the Civil & Environmental Engineering Rising Stars Workshop at MIT, Cambridge (October 2015)

"Problems in the Mechanics of Soft and Biological Materials: Cavitation, Creasing, Surface Growth", Invited talk in Prof. L. Mahadevan's group meeting, Harvard, Cambridge (July 2015)

"Shock Wave Propagation and Dynamic Cavitation in Solids", Invited seminar at the Department of Mechanical Engineering, Johns Hopkins University, Baltimore (March 2015)

"Dynamic Cavitation and Relaxation in Incompressible Nonlinear Viscoelastic Solids", Invited seminar at the Department of Polymer Science and Engineering, University of Massachusetts, Amherst
(December 2014)

"An Overview on Cavitation", Invited seminar at the Charles III University of Madrid, Spain. (October 2013)

"Cavitation Instabilities in Solids", Invited for an informal gathering on: The mechanics and physics of solids, Weizmann Institute of Science, Israel (June 2010)

Professional Activities

Co-organizer of the NEW.Mech 2017 - Workshop on the mechanics of materials and structure, MIT (October 2017).

Proceedings Editor of the 2012 ISIMM Symposium STAMM XVII, Technion I.I.T., Haifa, Israel (September 2012)

Journal Publications

J1. **Cohen, T.**, Kurzeja, P. and Bertoldi, K., 2017. Architected squirt-flow materials for energy dissipation. J. Mech. Phys. Solids. 109, 22-33.

J2. Lin, S.†, **Cohen, T.**†, Zhang, T.†, Yuk, H., Abeyaratne, R. and Zhao, X., 2016. Fringe instability in constrained soft elastic layers. Soft Matter, 12(43), pp.8899-8906.

J3. Tomassetti, G., **Cohen, T.** and Abeyaratne, R., 2016. Steady accretion of an elastic body on a hard spherical surface and the notion of a four-dimensional reference space. J. Mech. Phys. Solids. 96, 333-352.

J4. **Cohen, T.**, and Molinari, A., 2015, Dynamic Cavitation and Relaxation in Incompressible Nonlinear Viscoelastic Solids. Int. J. Solids Struct., 69-70, 544 - 552.

J5. **Cohen, T.**, and Durban, D., 2015, Steady Shock Waves in Porous Plastic Solids. Int. J. Solids Struct., 71, 70-78.

J6. Durban, D., **Cohen, T**. and Dafalias, Y. 2015, Solid Flow Fields and Growth of Soft Solid Mass, Procedia IUTAM, Symposium on Mechanics of Soft Active Materials, 12, 31-41.

J7. **Cohen, T.**, Durban, D., and Dafalias, Y., 2014, Dampening Effects on the Polymerization Rate of Actin Gel Surface Growth. Extreme Mechanics Letters, 1, 114-119.

J8. Rodríguez-Martínez, J.A., **Cohen, T.**, and Zaera, R., 2014, Approaching Steady Cavitation: The Time Scale in Hypervelocity Cavity Expansion in Work Hardening and Transformation Hardening Solids. Int. J. Impact. Engng., 73, 43-55.

J9. **Cohen, T.**, and Abeyaratne, R. 2014, Linearized Theory of Traffic Flow, arXiv:1412.7371.

J10. **Cohen, T.**, and Durban, D., 2014, Longitudinal Shock Waves in Solids: The Piston Shock Analogue. Proc. R. Soc. A, 470: 20130061.

J11. **Cohen, T.**, and Givli, S., 2014, Dynamics of a Discrete Chain with Bi-stable Elements: A Biomimetic Shock Absorbing Mechanism. J. Mech. Phys. Solids. 64, 426-439.

†Equal contributors.

J12. **Cohen, T.**, and Durban, D., 2013, Fundamental Solutions of Cavitation in Porous Solids - A Comparative Study. Acta Mech. 224, 1695-1707.

J13. **Cohen,T.**, and Durban, D., 2013, Hypervelocity Cavity Expansion in Porous Elastoplastic Solids, J. Appl. Mech., 82, 011017.

J14. **Cohen, T.**, and Durban, D., 2013, Plastic Instabilities in Porous Cylinders Under Triaxial Conditions, Eur. J. Mech. A/Solids, 37, 193-199.

J15. Durban, D., **Cohen, T**., Hollander, Y., 2010, Plastic Response of Porous Solids with Pressure Sensitive Matrix. Mech. Re. Commun., 37, 636-641.

J16. Masri, R., **Cohen, T.**, and Durban, T., 2010, Enlargement of a Circular Hole in a Thin Plastic Sheet: Taylor-Bethe Controversy in Retrospect, Quart. J. Mech. Appl. Math., 63, 589-616.

J17. **Cohen, T.**, Masri, R., and Durban, D., 2010, Ballistic Limit Predictions with Quasi-Static Cavitation Fields, Int. J. Prot. Struct., 1, 235-255.

J18. **Cohen, T.**, Masri, R., and Durban, D., 2010, Shock Waves in Dynamic Cavity Expansion, J. Appl. Mech., 77, 041009.

J19. **Cohen, T.** and Durban, D., 2010, Cavitation in Elastic and Hyperelastic Sheets, Int. J. Eng. Sci., 48, 52-56.

J20. **Cohen, T.**, Masri, R., and Durban, D., 2009, Analysis of Circular Hole Expansion with Generalized Yield Criteria, Int. J. Solids Struct., 46, 3643-3650.

Conferences*

1. **Cohen, T**. Cylindrical Shock Wave Propagation in Plane-Stressed Sheets, IUTAM Symposium on Dynamic Instabilities in Solids, Madrid, Spain (May 2016).

2. **Cohen, T**. and Abeyaratne, R., Surface Growth in Polymer Gels, ISTAM Annual Symposium, Tel-Aviv, Israel (December 2015).

3. **Cohen, T**. Durban, D. and Dafalias, F.Y., Constrained Surface Growth of Actin Gel. EMI, Stanford (June 2015).

4. **Cohen, T**. Durban, D. and Dafalias, F.Y, Dampening Effects on the Polymerization Rate of Actin Gel Surface Growth. New.Mech, UMass Amherst (October 2014).

5. Zaera, R., Rodríguez-Martínez, J.A, Vadillo, G., Fernàndez-Sez, J., Rittel, D., Rusinek, A., Pesci, R., Osovski, S. and **Cohen, T**., Deformation of Dynamically Phase Transforming Metals in Adiabatic Conditions: Thermal Effects and Instabilities, Invited plenary lecture at the 39^{th} Solid Mechanics Conference, Poland, Zakopane (September 2014).

6. **Cohen, T**. and Givli, S., Dynamics of a Discrete Chain of Bi-stable Elements: A Biomimetic Shock Absorbing Mechanism, Invited talk at the IUTAM Symposium on Mechanics of Soft Active Materials, Haifa, Israel, (May 2014).

7. Durban, D., **Cohen, T**. and Dafalias, Y., Solid Flow Fields and Growth of Soft Solid Mass, Invited talk at the IUTAM Symposium on Mechanics of Soft Active Materials, Haifa, Israel, (May 2014).

*Speaker is underlined

8. **Cohen, T**. and Durban, D., Propagation of Plastic Shock Waves in Porous Solids. Presentation and session chair at The 7th international workshop on dynamic behavior of materials and its applications in industrial processes, Madrid, Spain (May 2013).

9. **Cohen, T**. and Durban, D., Longitudinal Shock Waves in Human Tissue. Presentation at 32nd Israeli Conference on Mechanical Engineering (ICME 2012), Tel-Aviv Univ., Israel (October 2012).

10. **Cohen, T**. and Durban, D., Longitudinal Shock Waves in Solids: The Piston Shock Analogue. Presentation at the 2012 ISIMM Symposium STAMM XVII , Technion I.I.T., Haifa, Israel (September 2012).

11. **Cohen, T**. and Durban, D., Penetration of Ductile Porous Plane Sheets. Invited presentation at the Light-Weight Armor for Defence Security Meeting (LWAG), Technion, Haifa , Israel (March 2011).

12. Durban, D., **Cohen, T**. and Hollander,Y., Plastic Response of Porous Solids with Pressure Sensitive Matrix. Presented at the HSTAM International Congress on Mechanics, Limassol, Cyprus (July 2010).

13. **Cohen, T**. and Durban, D., Influence of Remote Tension on Dynamic Cavitation in Elastoplastic Solids. Invited for the US National Congress on Theoretical and Applied Mechanics (USNCTAM 2010), Penn. State Univ., USA (June 2010).

14. **Cohen, T**., Masri, R. and Durban, D., Residual Velocity Prediction with Plane-Stress Cavitation Fields. Invited presentation at the International Workshop on Structures Response to Impact and Blast - IWSRIB, Haifa, Israel (November 2009). (Peer reviewed manuscript published in proceedings. An extended version has been invited for publication in the new periodical: International Journal of Protective Structures).

15. **Cohen, T**. and Durban D., Dynamic Cavitation in Porous Elastoplastic Solids. Presented at the 7th European Solid Mechanics Conference, Lisbon, Portugal (September 2009).

16. **Cohen, T**. and Durban, D., Plane Stress Cavitation in Elastic Solids. Presented at the ISTAM Annual Meeting, Tel-Aviv, Israel (December 2008).

17. **Cohen, T**., Masri, R. and Durban, D., Plastic Instability in Plane Sheets with Generalized Isotropic Yield Functions. Presented at the Irish Society for Scientific Engineering Computation and Irish Mechanics Society Joint Symposium on Advances in Mechanics, Dublin, Ireland (April 2008).