



Professor Jacob Fish

See:

http://en.wikipedia.org/wiki/Jacob_Fish

<http://www.civil.columbia.edu/fac-bios/fish/faculty.html>

http://www.msec.rpi.edu/index.php?Itemid=67&option=com_zoo&view=item&category_id=17&item_id=17

<http://www.tam.northwestern.edu/seminars/fish.html>

<http://www.barnesandnoble.com/c/jacob-fish>

<http://engineering.columbia.edu/jacob-fish-pushing-limits-multiscale-science-and-engineering>

Rosalind and John J. Redfern Jr. 33 Chair in Engineering
Director, Multiscale Science & Engineering Center

Department Affiliations:

Department of Mechanical, Aerospace & Nuclear Engineering

Department of Civil & Environmental Engineering

Education:

Ph.D., Northwestern University, Theoretical and Applied Mechanics

M.S., Israel Institute of Technology, Structural Mechanics, Technion

B.S., Israel Institute of Technology, Structural Engineering

Background:

1982 - 1984 Structural Engineer: Buckshpan Civil Engineering Consulting Firm, Tel-Aviv, Israel.

1984 - 1986 Research Engineer: Methods Development Group, Israel Aircraft Industries, Ben - Gurion Airport, Israel.

1989 - 1994 Assistant Professor: Civil Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA.
1994 - 1998 Associate Professor: Mechanical, Aerospace and Nuclear Engineering, and Civil and Environmental Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA.
2001 - Visiting Chair Professor, Ecole Normale Supérieure de Cachan, France
1998 - 2005 Professor: Mechanical, Aerospace and Nuclear Engineering, and Civil and Environmental Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA.
1998 - present Professor: Information Technology, Rensselaer Polytechnic Institute, Troy, NY, USA.
2005 - present The Rosalind and John J. Redfern, Jr. '33 Chaired Professor in Engineering: Mechanical Engineering, Aeronautical Engineering, Rensselaer Polytechnic Institute, Troy, NY, USA.
2006 - Director, Multiscale Science & Engineering Center

Over the past 25 years (in both industry and academia) Dr. Fish has been in the forefront of multiscale computational mechanics in science and engineering. Professor Fish is one of the pioneers in recognizing that nature is replete with systems that encompass interacting behaviors occurring across a range of spatial and temporal scales. His scientific contributions span diverse applications such as the structural integrity of mechanical, aerospace and civil systems, electronic packaging, nanostructured material systems, biological systems, and energy absorption systems.

Research Interests:

Professor Fish's areas of research include simulation, computational mechanics, mathematical optimization, micro-electro-mechanical systems, advanced materials, structural integrity and high performance computing. He is Founder and Editor-in-Chief of the International Journal of Multi-scale Computational Engineering.

More information including awards and honors:

Dr. Fish has 25 years of experience (both industry and academia) in the field of multiscale computational engineering, which bridges the gap between modeling, simulation and design of products based on multiscale principles. Dr. Fish has published over 160 journal articles and book chapters. Two of his papers, one on development of multilevel solution techniques for large scale systems presented at the 1995 ASME International Computers in Engineering Conference and the second one, on fatigue crack growth in aging aircraft presented at the 1993 Structures, Structural Dynamics, and Materials Conference have won the Best Paper Awards. Dr. Fish is a recipient of 2005 USACM Computational Structural Mechanics Award given "in recognition of outstanding and sustained contributions to the broad field of Computational Structural Mechanics". Dr. Fish is a Fellow of both the United States Association for Computational Mechanics and the International Association for Computational Mechanics. He is the Editor-in-Chief of the International Journal for Multiscale Computational Engineering and Editorial Board Member of International Journal for Numerical Methods in Engineering, Computer Methods in Applied Mechanics and Engineering and International Journal for Computational Methods in Engineering Science & Mechanics. He served as the Associate Editor of Journal of Engineering Mechanics, Editor of the Bulletin of United States Association for Computational Mechanics and chaired the ASCE Computational Mechanics committee. He is the past President of United States Association for Computational Mechanics, past member of the National Research Council for the Air and Ground Vehicle Technology and currently serves on the IUTAM Working Party on Computational Fluid and Solid Mechanics.

Dr. Fish received an NSF Young Investigator Award, NASA Langley research grant related to High Speed Civil Transport (HSCT), contracts from Lockheed Missiles & Space Company, Sikorski, ALCOA, Northrop-

Grumman, GE and Allison Engines on various aspects of structural integrity, AFOSR, ONR, SANDIA and DARPA grants for development of multiscale computational techniques for advanced materials and structures. Dr. Fish is currently directing the National Science Foundation Nanoscale Interdisciplinary Research Teams (NIRT) program at Rensselaer. For his "significant contributions to computational science and engineering" he received 2003 Rensselaer School of Engineering Research Award. Dr. Fish co-chaired the Seventh U.S. National Congress of Computational Mechanics (over 1200 participants), and the First International Workshop on Multiscale Computational Engineering. He delivered over fifty invited talks in US, Europe, South America and Japan, presented several international keynote lectures and taught short courses on multiscale computational engineering in US and Europe. Dr. Fish served as a consultant to NY Department of Law, GE RD, Lockheed Missiles & Space Company, ANSYS, SDRC and EMRC software houses.

In 2010 Professor Fish received the International Association for Computational Mechanics (IACM) Computational Mechanics Award. Part of the citation follows:

“We are extremely proud of Dr. Jacob Fish’s selection for this prestigious award from the IACM. This is the highest recognition from his peers of his research and leadership in the field of computational mechanics,” said David Rosowsky, dean of the School of Engineering at Rensselaer. “Professor Fish has been an extremely active researcher, advising numerous graduate students at Rensselaer, and has created countless synergistic activities among faculty and students through his leadership of the Multiscale Science and Engineering Center. We congratulate Jacob on being selected to receive this international award. Given every two years, the IACM Computational Mechanics Award recognizes outstanding contributions or accomplishments by a researcher in the field. The IACM will honor Fish in July at the World Congress on Computational Mechanics in Sydney, Australia. Fish’s research encompasses a wide variety of science and engineering disciplines, from investigating the structural integrity of mechanical, aerospace, and civil systems, to electronic packaging, nanostructured material systems, biological systems, and energy absorption systems. Fish is considered a pioneer in multiscale computation, and for emphasizing in his research how nature is replete with systems that encompass interacting behaviors occurring across a range of spatial and temporal scales. His most recent research work, titled ‘Computational Continua’, has been regarded as ‘one of the most significant contributions to the field of mechanics in the past decade.’ ”

Professor Fish’s recent textbook, *A First Course in Finite Elements*, was released in 2008 to acclaim. The book has been integrated into curriculums at universities across the globe, and is currently being translated into several different languages.

Selected Publications:

J. Fish, "Bridging the scales in nano engineering and science," to appear in *Journal of Nanoparticle Research*, (2006).

H. Waisman and J. Fish, "Space-time multigrid method for molecular dynamics simulations," submitted to *Comp. Meth. Appl. Mech. Engng.*, (2005).

J. Fish , W. Chen, and Y. Tang, "Generalized Mathematical Homogenization of Atomistic Media at Finite Temperatures," *International Journal for Multiscale Computational Engineering*, Vol.3 Issue 4,(2005).

J. Fish and Z. Yuan, "Multiscale Enrichment based on Partition of Unity for Nonperiodic Fields and Nonlinear Problems," submitted to *Computational Mechanics* , (2005).

W. Chen and J. Fish, "Mathematical Homogenization Perspective of Virial Stress," accepted in International Journal for Numerical Methods in Engineering, (2005).

J. G. Michopoulos, C. Farhat and J. Fish, "Survey on Modeling and Simulation of Multiphysics Systems," Journal of Computing and Information Science in Engineering Vol 5, Issue 3, 198-213 (2005)

J. Fish and C. Oskay, "Nonlocal Multiscale Fatigue Model," Mechanics of Advanced Materials and Structures Vol 12, Issue 6, 485-500 (2005)

W. Chen and J. Fish, "A Generalized Space-Time Mathematical Homogenization Theory for Bridging Atomistic and Continuum Scales," submitted to International Journal for Numerical Methods in Engineering (2004)