Yaron Toledo – Curriculum Vitae

General Information

Birth date: 2.3.76
Tel: +972-6406361
E-mail: toledo@tau.ac.il

Research Interests

- Surface gravity and internal waves in the ocean
- Wave-bottom-current-wind interactions
- Geophysical and environmental fluid dynamics
- Underwater acoustics
- Transport of oil spills, pollutants, wastewater and brine in the ocean
- Measurements of the oceanographic parameters using radars and acoustic Doppler current profilers
- Analytical methods for solving/simplifying nonlinear differential equations

Education

The Technion – Israel Institute of Technology, Haifa, Israel

Ph.D. (direct track), Civil and Environmental Engineering, December 2008

- Dissertation title: "Refraction and Diffraction of Linear and Nonlinear Waves"
- Advisor: Prof. Yehuda Agnon

M.S., Civil and Environmental Engineering, September 2004

The Technion – Israel Institute of Technology, Haifa, Israel

B.Sc. (Cum Laude), Civil Engineering, December 1998

Research Experience (Ph.D.)

Tel-Aviv University, School of Mechanical Engineering, Israel

Senior lecturer **Oct 2013** -present

- Deterministic and stochastic near-shore surface gravity wave modeling.
- Wave interactions with shearing currents.
- Nonlinear wave-bottom interactions.
- wave-wind interactions.

Wuppertal University, Germany

Alexander von Humboldt post-doctoral research fellow **July 2011 - June 2013**

- Deterministic and stochastic near-shore surface gravity wave modeling.
- Wave interactions with shearing currents.
- Nonlinear wave-bottom interactions.
- Gravity waves in the atmosphere.

Technical University Darmstadt, Germany

Max Planck Institute – Minerva post-doctoral research fellow **May 2010 - June 2011**

- Deterministic near-shore surface gravity wave modeling.
- Wave-current interactions.
- Nonlinear wave-bottom interactions.

German-Israeli Young Scientists Exchange Project **Jan. 2010 - Apr. 2010**
Cooperation with ISMAR-CNR, Venice, Italy

- A coupled model for circulation and surface gravity waves.
- Theory and application of modeling a desalination outlet within a circulation model.

The Technion – Israel Institute of Technology, Haifa, Israel

Post-doctoral researcher **Apr. 2009 - Dec. 2009**

- A 1D stochastic quadratic nonlinear model for wave shoaling.
- A Pseudo-potential mild-slope equation model.

Research and Development / Management Experience

Israeli Navy, Hydrographic branch, Tel-Aviv, Israel

Research and development engineer, head of research squad **Apr. 2000 - July 2003**
R&D in the field of underwater acoustics, operational numerical models, oceanographic and acoustic field measurements, external instructor in the Israeli navy's academy on underwater acoustics. During the last year and a half, heading a research squad on various topics of propagation and reverberations of underwater sound.

The Technion – Israel Institute of Technology, Haifa, Israel

Research assistant (part time) **Mar. 2000 - July 2001**
Research projects focused on chaotic and non-chaotic nonlinear vibrations of pendulums and strings as well as thin film flows.
Work responsibilities included analytical modeling using perturbation techniques and numerical modeling of the resulting differential equations.

Israeli Defense Force, main construction center, Tel-Aviv, Israel

Project manager **Apr. 1999 - Mar. 2000**
Managing construction projects including design integration, supervision, and project budget handling.

Teaching Experience

School of Mechanical Engineering, Tel-Aviv University, Israel
Lecturer **Mar. 2014 - Aug. 2014**

- Marine Engineering, (mixed under-graduate and graduate course, 1 semester)

Responsible on course material development, lectures and tutorials in a mixed under-graduate and graduate course. The work included preparing and grading homework programing

projects and exams.

Department of Marine Geosciences, Haifa University, Israel
Lecturer **Sept. 2009 - Jan. 2010**

- Geophysical fluid dynamics, (graduate course, 1 semester)

Responsible as a sole teacher on course material development, lectures and tutorials in a graduate course. The work included preparing and grading homework assignments and exams.

The Technion – Israel Institute of Technology, Haifa, Israel (Tel-Aviv branch)
Lecturer **Sept. 2008 - Jan. 2009**

- Foundations of Applied Mathematics for Engineers, (graduate course)

Responsible as a sole teacher on lectures and tutorials in a graduate course. The work included preparing and grading homework assignments and exams.

Teaching assistant **Sept. 2004 - Jan. 2009**

- Statistics (undergraduate course, 4 semesters)
- Foundations of Applied Mathematics for Engineers (graduate course, 5 semesters)

Tutorials in graduate and undergraduate courses. Sole TA in the graduate course. The work included preparing and grading homework assignments and exams.

Teaching assistant **Sept. 1998 - Jan. 1999**

- Numerical Methods (undergraduate course, 1 semester)

Computer laboratory tutorials including frontal teaching and classwork assistance. Sole TA of the C language group. Duties included transferring the course materials from Fortran to the C computer language as well as preparing and grading homework assignments and exams.

Grants, Honors and Awards

- Israeli Science Foundation. Individual Research Grant no. 1940/14. Next generation surface-wave models and their verification using field measurements in the East Mediterranean basin. 2014-
- Israeli Science Foundation. New-Faculty Equipment Grant no. 2042/14. A system for large-scale and continuous field measurements of surface waves, currents and vertical shear in the East Mediterranean basin. 2014-
- Israel's Ministry of Science and Technology Grant. Observing and modeling the Eastern Med. in the light of a changing world. Program Coordinator (PIs: Pinhas Alpert, Yehuda Agnon, Hezi Gildor and Yosef Ashkenazy) 2014-
- The Alexander von Humboldt institute post-doctoral fellowship, 2011
- The Danish–Israeli Nachemsohn study foundation scholarship (travel funds for cooperation with Prof. Per Madsen, DTU), 2011
- Max Planck Institute – Minerva post-doctoral fellowship, 2010
- The German–Israeli Young Scientists Exchange Program (BMBF–MOST, grant YSEP45),

2009

- Irmai prize (faculty) for best research in hydrodynamics – Ph.D. thesis, 2009
- The Technion's prize for excellence in teaching, 2 with honor notations for repeating achievements, 2004,2005,2006,2007
- Irmai prize (faculty) for best research in hydrodynamics – Master thesis, 2006
- Civil and Environmental Engineering faculty scholarship for excellence in Ph.D. studies, 2005
- Fein scholarship (The Technion) for excellence in Ph.D. studies, 2004
- Rieger fellowship (national) for excellence in environmental studies, 2004
- Salti prize (national) for excellence in graduate studies, 2004
- The Geophysical Fluid Dynamics fellowship in the Woods Hole Oceanographic Institute (international, 10 fellowships in a year, the only one from an Israeli university), 2004
- The Civil and Environmental Engineering dean's undergraduate excellence notation (4 times), 1995-8

Publications in final stages of preparation

Groeneweg J., van Gent M., van Nieuwkoop J. and Toledo Y. Wave propagation into coastal systems with complex bathymetries (submitted)

Toledo, Y., H. Bingham, C. Eden and R. Ferrari, A high-order Boussinesq approach for the surface quasi-geostrophic model (work in final stages)

Toledo, Y. and V. I. Shrira, A wave action equation for water waves propagating on vertically sheared flows (work in final stages)

Madsen, P. A. and Toledo, Y. , A rapid convolution method for calculating tsunami waves (in writing)

Publications in peer reviewed journals

J. Muraschko, M. Fruman, U. Achatz, S. Hickel, and Y. Toledo (2014) On the application of WKB theory for the simulation of weakly nonlinear dynamics of gravity waves, *Quarterly J. of the Royal Met. Soc.* (in press)

Toledo, Y. (2013) An oblique parabolic equation model for linear and nonlinear wave shoaling. *J. of Fluid Mech.* 715, 103-133.

Toledo, Y. and Agnon Y. (2012) Stochastic evolution equations with localized nonlinear shoaling coefficients. *European Journal of Mechanics - B/Fluids*, 34, 13-18.

Toledo Y., Hsu T.-W. and Roland A. (2012) Extended time-dependent mild-slope and wave action equations for wave-bottom and wave-current interactions. *Proc. of the Royal Soc. A.* 468, 184-205.

Toledo, Y. and Agnon Y. (2011) Three dimensional application of the Complementary Mild-Slope Equation. *Coastal Engineering*, 58(1), 1-8.

Manam, S.R., Toledo, Y. and Agnon Y. (2011) Complementary Mild-Slope Equations in two layer fluids. *Wave Motion*, 48 (3), 223-234.

Toledo, Y. and Agnon Y. (2010) A Scalar Form of the Complementary Mild-Slope Equation. *J. of Fluid Mech.*, 656, 407-416.

Toledo, Y. and Agnon Y. (2009) A nonlinear Complementary Mild-Slope Equation set model. *J. of Fluid Mech.* 641, 509-520.

Toledo, Y. and Agnon Y. (2006) On uniformly accurate high-order Boussinesq difference equations for water waves. *Int. Journal for Numerical Methods in Fluids*, 50(8), 925-945.

Contributed work

Toledo, Y. and V. I. Shrira (2012) A wave action equation for water waves propagating on vertically sheared flows. American Geophysical Union, fall meeting, San Fransisco (poster)

J. Muraschko, M. Fruman, U. Achatz, S. Hickel, and Y. Toledo (2012) On the application of WKB theory for the simulation of multi-scale gravity wave interactions. European Geophysical Union General Assembly, Vienna, Austria (poster).

Toledo, Y. (2011) Two-dimensional deterministic and stochastic evolution equations for shoaling of nonlinear waves. Proceedings of the 26th International Workshop on Water Waves and Floating Bodies at Athens, Greece, 189-192.

Hsu, T.-W., Lin, T.-Y., Toledo, Y. and Roland, A. (2010) A nonlinear parabolic equation to account for wave transformation in the surf zone. Proceedings of the 29th International Conference on Ocean, Offshore and Arctic Engineering, OMAE 2010, ASME , Shanghai, China, June 2010, 20974, 1-6.

Avni, R., Toledo, Y. and Agnon Y. (2009) Linear and Nonlinear Complementary Mild Slope Equations. Proceedings of the 24th International Workshop on Water Waves and Floating Bodies at Saint Petersburg, Russia, April 2009, 22-25.

Toledo, Y. (2004) High order Boussinesq models for internal interfacial waves. Geophysical Fluid Dynamics proceedings, Geophysical Fluid Dynamics summer program of the Woods Hole Oceanographic Institute, 205-226. Under supervision of Prof. Josef Keller and Prof. Raffale Ferrari.

Conference talks

Toledo, Y. and V. I. Shrira (2013) "Linear and nonlinear wave shoaling of directional waves" WISE – Waves In Shallow Environment, College Park, Maryland, USA

Toledo, Y. and V. I. Shrira (2012) "Some theoretical advancements and improved conceptions in ocean wave shoaling and wave-current interactions" Geophysical Fluid Dynamics Symposium, Ben Gurion University, Israel

Toledo, Y. (2012) "Linear and nonlinear wave shoaling of directional waves" WISE – Waves In Shallow Environment, Barcelona, Spain

Toledo, Y. (2011) "Two-dimensional deterministic and stochastic evolution equations for shoaling of nonlinear waves" The 26th Int. Workshop on Waves and Floating Bodies, Athens, Greece

Toledo, Y., Agnon Y. and Roland A. (2010) "Nonlinear wave-bottom interactions in stochastic wave models" WISE – Waves In Shallow Environment, Brest, France

Avni, R., Toledo, Y. and Agnon, Y.(2009) "Linear and nonlinear complementary mild slope equations" The 24th Int. Workshop on Waves and Floating Bodies, St. Petersburg, Russia

Toledo, Y. and Agnon, Y. (2008) "On the complementary mild slope equation (CMSE) and its nonlinear extension" WISE – Waves In Shallow Environment, Helsinki, Finland

Toledo, Y. and Agnon, Y. (2006) "On uniformly accurate high-order Boussinesq difference equations for water waves" WISE – Waves In Shallow Environment, Venice, Italy

Invited talks

Toledo, Y. and V. I. Shrira (2013) "Some theoretical advancements and improved conceptions in ocean wave shoaling and wave-current interactions" Faculty of Mechanical Engineering, UC Berkely, USA.

Toledo, Y. and V. I. Shrira (2012) "Some theoretical advancements and improved conceptions in ocean wave shoaling and wave-current interactions" NOAA headquarters, Washington, USA; Delaware University, USA; Princeton University, USA; CICESE, Ensenada, Mexico; Faculty of Engineering, Tel-Aviv University; The Ring Department of Atmospheric Sciences, Hebrew University, Israel

Toledo, Y. (2012) "A parabolic equation model for oblique incident free-surface gravity waves" Danish Technological University, Denmark

Toledo, Y. (2011) "Nonlinear water waves" Institute of Coastal Research, Helmholtz Center Geesthacht, Germany; Institute of Oceanography, University of Hamburg, Germany

Toledo, Y. (2011) "Nonlinear wave propagation in the near-shore environment" School of Naval Architecture and Marine Eng., National Tech. Univ. of Athens, Greece

Toledo, Y. (2011) "Nonlinear wave-bottom interactions in the near-shore environment" Atmosphere and Environment, Geosciences Department, Goethe University, Germany

Toledo, Y. (2011) "Two-dimensional nonlinear shoaling" Department of Mechanical Eng., The Technion, Israel; Department of Civil and Environmental Eng.,The Technion, Israel; Environmental Sciences and Energy Research, Weizmann Institute, Israel; Faculty of Engineering, Tel-Aviv University, Israel; The Ring Department of Atmospheric Sciences, Hebrew University, Israel

Toledo, Y. (2011) "Nonlinear wave-bottom interactions in the near-shore environment" Laboratoire Saint-Venant, EDF - Recherche et Développement, France

Toledo, Y. (2010) "Nonlinear near-shore wave modeling" Instituto di Sciensa Marine, Consigilo Nazionale delle Reseche, Italy

Toledo, Y. and Agnon, Y. (2010) "Linear and nonlinear complementary mild slope equations"

Danish Technological University, Denmark; Environmental Sciences and Energy Research, Weizmann Institute, Israel; Instituts für Wasserbau und Wasserwirtschaft, Darmstadt Tech. University, Germany; The Ring Department of Atmospheric Sciences, Hebrew University, Israel; Department of Solar Energy & Environmental Physics, Ben Gurion University, Israel; Department of Civil and Environmental Eng., National Cheng Kung University, Taiwan

Roland, A., Zanke, U., Umgiesser, G., Toledo, Y. (2009) "Development of the WWMII-SHYFEM coupled wave-current forecasting model" Israeli navy headquarters, Hydrographic branch, Tel-Aviv, Israel

Toledo, Y. (2009) "Nonlinear near-shore modeling" Department of Civil and Environmental Eng., National Cheng Kung University, Taiwan

Toledo, Y. and Agnon, Y. (2008) "On uniformly accurate high-order Boussinesq difference equations for water waves" Department of Earth & Planetary Sciences, The University of Tokyo, Japan

Toledo, Y. and Agnon, Y. (2006) "Derivation of nonlinear mild-slope equations using pseudo-differential operators" Department of Civil and Environmental Eng., MIT, USA

Toledo, Y. (2004) "High order Boussinesq models for internal interfacial waves" Woods Hole Oceanographic Institute, USA

Administrative Responsibilities

- Waves In Shallow Environment conference, member of steering comity, 2014-
- Member of teaching comity, The Israeli Center for Mediterranean Research, 2014-
- Academic consultant for students of the Geophysics - Mechanical Engineering double Bachelor degree, 2014-
- Academic consultant for students of the Marine Biology - Mechanical Engineering double Bachelor degree, 2013-2014
- Organization a Tel-Aviv University–Ruppin symposium on Marine Sciences, 2013

Ad-hoc journal reviewer

Applied Ocean Research, Ocean Engineering, Mathematical Problems in Engineering, Journal of Engineering Mathematics, Physics of Fluids.

Community involvement and outreach

The Perach Tutorial Project **September 1995 - July 1998**

An instructor of a group of elementary-school children from an underprivileged background on topics of environment and nature (1 year). A tutor of boarding school high-school students from underprivileged backgrounds, subjects: mathematics, English and chess (2 years).

Additional skills

Computing skills: C, C++, Fortran, Matlab, Mathematica, Maple, Windows, Unix/Linux
Diving certificate: Advanced open water diver – PADI
Languages: Hebrew (mother tongue), English (fluent), Spanish, French, German (intermediate)
Hobbies: Modern improvisation dance, Yoga, Far eastern philosophy, Music (bass guitar)