CELALETTIN EMRE OZDEMIR, PH.D.

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EDUCATION

Ph.D. in Civil Engineering, University of Florida   August 2010

Dissertation title: Numerical simulation of particle-laden flow in oscillatory channel and its
implication on wave-suspended sediment transport

Advisors: Dr. Tian-Jian Hsu and Dr. S. Balachandar

M.S. in Civil Engineering, Middle East Technical University   July 2003

Thesis title: A feasibility study on scour countermeasures around bridge piers

Advisor: Dr. Melih Yanmaz

B.S. in Civil Engineering, Middle East Technical University   June 2001

PROFESSIONAL EXPERIENCE

Postdoctoral Investigator   Feb. 2012 – Present

Woods Hole Oceanographic Institution (WHOI)

Applied Ocean Physics and Engineering

Postdoctoral Researcher   Sep. 2010 – Jan. 2012

University of Delaware

Center for Applied Coastal Research, Civil and Environmental Engineering

Graduate Research Assistant   Jan. 2006 – Aug. 2010

University of Florida

Civil Engineering

Graduate Research Assistant   Aug. 2003 – Dec. 2005

University of Iowa

Iowa Institute of Hydraulic Research (IIHR)

Graduate Research/Teaching Assistant   Sep. 2001 – July 2003

Middle East Technical University

Civil Engineering

PROFESSIONAL AFFILIATIONS

- American Society of Civil Engineers (ASCE)
- American Geophysical Union (AGU)
- American Physical Society (APS)
- International Association of Hydraulic Research (IAHR)

HONORS & AWARDS

Outstanding contribution to International Conference on Coastal Engineering (ICCE), 2012, awarded by the
Coastal Engineering Research Council (with Tian-Jian Hsu, Xiao Yu, and S. Balachandar)

PROFESSIONAL SERVICE

Journal reviewer for:

- Advances in Water Resources
- Computers and Geosciences
- Journal of Geophysical Research-Earth Surface
- Journal of Geophysical Research-Ocean
- Ocean Modeling
- Physics of Fluids

RESEARCH INTERESTS

○ Environmental fluid dynamics and sustainability
  □ Computational sediment transport modeling
    - Two-phase flow modeling of particulate flows and their parameterization in large-scale models
    - Break up and agglomeration processes in fluid-mud
  □ Simulation and modeling of multi-scale turbulent processes
    - Direct numerical simulation (DNS) of transient and turbulent flows
    - Simulation and modeling of turbulent flow around complex morphology/structures
  □ Advanced scientific computing
    - Parallel computing in turbulent and multiphase flow simulations

TEACHING INTERESTS

<u>Undergraduate teaching</u>: Fluid Mechanics, Open Channel Hydraulics, Water Resources Engineering, Numerical Methods in Engineering, Freshman Design, Introduction to Environmental Hydraulics

<u>Graduate teaching:</u> Cohesive and Non-Cohesive Sediment Transport, Multiphase Modeling in Environmental Flows, Introduction to Computational Fluid Dynamics, Turbulence and Mixing in Environmental Flows, Turbulence in Geophysical Flows

PUBLICATIONS

<u>Refereed Journal Publications</u>

1. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2013). "A direct numerical simulation study on bottom boundary layer turbulence under a solitary wave: instability mechanisms, flow transience and characteristics of flow turbulence." *J. Fluid Mech.* (In press).

2. Yu, X., **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2013). "A 3D numerical investigation of fine sediment transport in an oscillatory channel – The effect of rheology." *J. Waterw. Port, C.-ASCE.* (In press, invited paper)

3. Dai, A., **Ozdemir, C. E.**, Cantero, M. I., and Balachandar, S. (2012). "Gravity currents from instantaneous sources down a slope." *J. Hydraul. Eng-ASCE*, 138(3), doi: 10.1061/ (ASCE) HY.1943-7900.0000500.

4. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2011). "A numerical simulation of lutocline dynamics and saturation of fine sediment in the oscillatory boundary layer." *J. Geophys. Res.-Ocean*, 116, C09012. doi: 10.1029/2011JC007185.

Refereed Journal Publications (Continued)

5. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2010). "A numerical investigation of fine particle laden flow in oscillatory channel: The role of particle-induced density stratification." *J. Fluid Mech.*, 665, 1-45. doi:10.1017/S0022112010003769.

6. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2010). "Simulation of fine sediment transport in oscillatory boundary layer." *J. of HydroEnviron. Res.*, 3, 247-259. (Invited paper)

7. Hsu, T-J., **Ozdemir, C. E.**, and Traykovski, P. A. (2009). "High resolution numerical modeling of wave-supported gravity-driven fluid-mud transport." *J. Geophys. Res.-Ocean*, 114, C05014. doi: 10.1029/2008JC005006.

8. Constantinescu, G. S., Krajewski, W. F., **Ozdemir, C. E.,** and Tokyay, T. (2007). "Simulation of flow around rain gauges: Comparison of LES with RANS models." *Adv. in Water Resour.*, 30, 43-58. doi:10.1016/j.advwatres.2006.02.011.

Manuscripts in Preparation (Draft can be provided upon request.)

1. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. "Direct numerical simulations of transition and turbulence in Stokes boundary layer" *Phys. Fluids.*

Refereed Conference Proceedings (Presented by first author)

1. Hsu, T., Yu, X., **Ozdemir, C.**, and Balachandar, S. (2012). "A 3D numerical investigation of fine sediment transport in an oscillatory channel". *Coastal Engineering Proceedings, 1*(33), sediment.9. doi:10.9753/icce.v33.sediment.9 (Honored as outstanding contribution to ICCE 2012)

2. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2011). "Numerical simulation of fine sediment transport in wave boundary layer." *Proc., Coastal Sediments '11*, P. Wang, J. Rosati, and T. M. Roberts, eds., World Scientific, Hackensack, NJ, 1514–1527.

3. **Ozdemir, C. E.**, Hsu T.-J., and Balachandar, S. (2010). "Fine particle laden flow simulations with simplified Eulerian-Eulerian approach." *Proc., 7th International Conference on Multiphase Flow,* University of Florida, Gainesville, FL, 1-7.

4. **Ozdemir, C. E.**, Hsu, T.-J., and Balachandar, S. (2008). "The dynamics of fluid-mud transport in the oscillatory boundary layer using direct numerical simulation." *Proc., 2nd International Symposium on Shallow Flows (ISSF)*, ASCE, Reston, VA.

5. Yanmaz, A. M., and **Ozdemir, C. E.** (2004). "A Feasibility Study on Bridge Scour Countermeasures" *Proc. World Water and Environmental Resources Congress 2004*, Sehlke, G., Hayes, D. F., and Stevens, D. K. eds, ASCE, Reston, VA, 1-8.

Technical Reports

1. **Ozdemir, C. E.**, and Hsu, T-J. (2008). "3D CFD modeling of spillway flow and its implication to downstream erosion." Florida Water Resources Research Center (FWRRC) Report FY2008 for WRRC: 2006FL146B.

2. **Ozdemir, C. E.**, and Hsu, T-J. (2008). "Complex flows through culvert structures by CFD modeling." FWRRC Annual Report FY2008 for WRRC: 2006FL146B.

3. Hsu, T-J., Newman, M. A., and **Ozdemir, C. E.**, (2006). "Erosion at hydraulic structure-A literature survey." FWRRC Annual Report FY2006 for WRRC: 2006FL145B.

Oral Presentations by Ozdemir

1. **Ozdemir, C. E.,** Hsu ,T-J., Traykovski, P., and Balachandar, S. (2012). "3D numerical simulation of fine sediment transport in oscillatory channel-The effect of wave intensity." *2012 Ocean Sciences Meeting*, Salt Lake City, UT. (Abstract id: 9508).

2. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2011). "The effect of wave intensity on fine sediment transport in oscillatory channel." *64th Annual Meeting of the APS Division of Fluid Dynamics*, Baltimore, MD. (Abstract id: DFD11-2011-000833).

3. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2010). "Numerical investigation of lutocline in oscillatory boundary layer." *AGU 2010 Fall Meeting*, San Francisco, CA. (Abstract id: OS54A-08).

4. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2010). "The role of turbulence modulation in wave-induced fine sediment transport." *2010 Ocean Sciences Meeting*, Portland, OR. (Abstract id: GO31A-06).

5. **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2009). "The dynamics of fine sediment transport in the oscillatory boundary layer." *Workshop on modeling of turbidity currents and related gravity currents*, Santa Barbara, CA.

Other Presentations

6. Hsu, T-J., Yu, X., **Ozdemir, C. E**.,and Balachandar, S. (2013). "On turbulence modulation due to the presence of sediment in the bottom boundary layer – a numerical investigation." *AGU Meeting of the Americas,* Cancun, Mexico.

7. Hsu, T-J., **Ozdemir, C. E.**, Yu, X., and Balachandar, S. (2012). "Understanding the state of muddy seabed —A numerical study utilizing the multiphase flow approach." *AGU 2012 Fall Meeting*, San Francisco, CA. (Abstract id: 1483842). (Invited talk)

8. Davis, J. R., **Ozdemir, C. E.**, Balachandar, S., and Hsu, T–J. (2012). "Development of a distributed memory parallel multiphase model for the direct numerical simulation of bottom boundary layer turbulence under combined wave-current flows." *AGU 2012 Fall Meeting,* San Francisco, CA. (Abstract id: 1499235).

9. Yu, X., Hsu, T-J., Balachandar, S., and **Ozdemir, C. E.** (2012). "The effect of rheology on the flow regimes of fine sediment in oscillatory bottom boundary layer—A numerical investigation." *AGU 2012 Fall Meeting,* San Francisco, CA. (Abstract id: 1487117).

10. Yu, X., **Ozdemir, C. E.**, Hsu, T-J., and Balachandar, S. (2012). "Numerical simulation on fine sediment transport in steady and oscillatory boundary layer—The role of rheology." *65th Annual Meeting of the APS Division of Fluid Dynamics*, San Diego, CA.

11. Hsu, T-J., **Ozdemir, C. E.**, Yu, X., and Balachandar, S. (2012). "Turbulence-resolved numerical investigation on fine sediment transport in wave bottom boundary layer - Physics of lutocline and laminarization." *Workshop on Environmental and Extreme Multiphase Flows,* Gainesville, FL.

12. Yu, X., **Ozdemir, C. E.**, Cheng, Z., Hsu, T-J., and Balachandar, S. (2012). "Numerical simulation on fine sediment transport in the oscillatory boundary layer- The role of rheology and particle inertia." *2012 Ocean Sciences Meeting*, Salt Lake City, UT. (Abstract id: 10313).

Other Presentations (Continued)

13. Hsu, T-J., **Ozdemir, C. E.**, Yu, X., Snyder P. J., Chen, J-L., and Shi, F. (2010). "The trapping and delivery of fine sediment in the coastal environment." *AGU Chapman Conference on Source to Sink Systems around the World and through Time,* Oxnard, CA.

14. Hsu, T-J., **Ozdemir, C. E.**, Son, M., Torres-Freyermuth, A., and Balachandar, S. (2008). "A numerical modeling framework for fluid-mud transport in estuary and continental shelf." *AGU,2008 Fall Meet.* San Francisco, CA*.* (Abstract id: OS11F-05).

15. **Ozdemir, C. E.**, Hsu, T-J., and Traykovski, P. (2008). "High resolution numerical model of wave supported gravity-driven mudflow and its parameterization." *2008 Ocean Science Meeting*, Orlando, FL.

INVITED TALKS

1. "Numerical simulation of fine sediment transport in wave boundary layer and its implication to the state of muddy seabed." Civil & Environmental Engineering, Lehigh University, Bethlehem, PA, March 28, 2013.

2. "A direct numerical simulation study on boundary layer turbulence under a solitary wave: The flow transience and the effect of initial conditions." Coastal Ocean Fluid Dynamics Laboratory (COFDL) Seminar, Woods Hole Oceanographic Institution, Woods Hole, MA, June 15, 2012.

3. "Numerical simulation of fine sediment transport in wave boundary layer and its implication to the state of muddy seabed." COFDL Seminar, Woods Hole Oceanographic Institution, Woods Hole, MA, August 12, 2011.

4. "A numerical investigation of fine particle laden flow in oscillatory channel." Ocean Engineering Seminar Series, Center for Applied Coastal Research, University of Delaware, Newark, DE, September 26, 2010.

VOLUNTEER ACTIVITIES

1. Representative, WHOI Postdoctoral Association   Mar. 2012 – Nov. 2012

2. Vice President, IIHR Student Organization (SIIHR)   Jan. 2004 – Dec. 2005

REFERENCES

1**. Tian-Jian Hsu, Associate Professor**
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3**. Peter Traykovski, Associate Scientist**
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