JAEHO SHIM

322 E. Front St., Suite 340, Boise, ID 83702
E-mail: jshim@uidaho.edu

EDUCATION

Ph.D. **University of Arizona**, Tucson, AZ — January 2017
Civil Engineering and Engineering Mechanics
- *Dissertation title:* Experimental and Numerical Studies of Grain Scaled Bed-Load Transport
- *Advisor:* Prof. Jennifer G. Duan

M.S. **Yeungnam University**, Daegu, South Korea — February 2010
Civil and Environmental Engineering
- *Thesis title*: Analysis of Serial Transverse Structure's Effect in a Channel Flow
- *Advisor*: Prof. Kwangik Son

B.S. **Yeungnam University** — February 2007
Civil and Environmental Engineering
- *Thesis title*: Study on Flow Resistance and Sediment Transport with Sediment Deposition in Horizontal Pipe

RESEARCH

University of Idaho, *Postdoctoral Fellow* — **Spring 2019 - present**

- Develop a Formula for Determining Scour Depth around Structures in Gravel-bed Rivers
  : Work on TRB project (NCHRP 24-48)
  - Develop a simple equation for scour in gravel-bed channels
  - Investigate fluid shear stress in the scour hole as scour progress
  - Study on the change in critical shear stress with scour depth as different sediment layer are accessed.
  - Conduct experimental investigation of local scour around bridge pier using SfM to obtain high-resolution and accurate topography

University of Idaho, *Research support* — **Fall 2018**

- Bed roughness study using particle protrusion at treasure valley, ID
  : Work on USFS research project
  - Evaluated particle protrusion using SfM to obtain accurate topography and grain size distribution
  - Investigated the distribution of particle concentration for the bed roughness in gravel bed

University of Arizona, *Research Technician* — **Spring 2017- Summer 2018**

- Sediment Transport and Erosion Study at the Altar Valley, Tucson, AZ
  : Work on Pima County Regional Flood Control District project
  - Investigated loss of watershed function as a result of channel down-cutting and erosion using GIS
  - Evaluated watershed instability using the investigation of historic GIS data
  - Investigated the watershed contribution for the soil erosion suggesting instability using SWAT, KINEROS2

University of Arizona, *Research Assistant* **Fall 2011- Fall 2016**

- Integrated Experimental and Numerical Modeling Study of Non-uniform Sediment Transport: Work on NSF project
  - Investigated the motion of bed load particles in the meandering channels.
  - Stochastic analyzes for bed-load particle velocity
  - Conducted numerical simulation of sediment transport using coupled CFD-DEM and investigated sediment particle motion characteristic.
  - Developed the Particle Motion Tracking software (using OpenCV) to attain sediment motion characteristic
  - Conducted sediment transport analysis in the Santa Cruz River for stable channel design

- Flood Induced Bridge Scour Prediction using Bio-Inspired Smart Sensor Network
  : Work on NSF project
  - Developed the monitoring system for real-time local scour monitoring around bridge pier
  - Conducted experimental and statistical investigation of local scour around bridge pier
  - Conducted numerical Simulation of local scour around bridge pier using SPH and investigated the difference local scour depth between steady flow and unsteady flow
  - Investigated the characteristic of moving particles around bridge pier

- Watershed Erosion and Sediment Assessment of Barry M. Goldwater Air Force Range (BMGR) West
  : Work on US Department of Defense project
  - Developed the surface monitoring system using 3D camera for real-time surface erosion monitoring
  - Conducted surface erosion analysis using LiDAR
  - Watershed erosion investigated using integrated surface runoff and erosion estimated model

- Sediment Transport Models and Stream Monitoring of the Lower Santa Cruz River
  : Work on Pima County Regional Flood Control District project
  - Sediment transport analysis using HEC-RAS
  - Conducted flood prediction under steady/unsteady condition

Disaster Prevention Institute, *Researcher* **Spring 2010- Summer 2010**

- NRF project in Disaster prevention institute, Daegu, South Korea.
  - *Title:* Research Center of Flood Defense Technology for Next Generation
  - Resulted The Flood Control Technology by Change of Future Environment
  - Demonstrated Hydraulic structure model design for River Recovery Project

Yeungnam University, *Research Assistant* **Spring 2007- Fall 2010**

- Recovery Project for Nakdong River, Daegu, South Korea — Dec ‘09- Oct ‘10
  - Hydraulic model test for barrage design
- Sediment Deposit Prevention Design Technique in a Circular Sewer-Line — May ‘09- Apr ‘10
- The Effectiveness Analysis of Sediment Runoff Observation Network and Reduction Facilities — Apr ‘09- Dec ‘09
- Total Recovery Techniques Research of Unit District for Multiple Damage Area — Dec ’07- Jan ‘08
  - Development of Flood Disaster Information System and Reduction Technology for Control District Unit
- The Study of Topography & Environmental Changes to Dredge the River Bed: Sediment System Analysis of the Basin — Oct ’06-Dec ’07

University of Iowa, IIHR-Hydroscience & Engineering Laboratory, *Visiting Scholar* **Spring 2008- Fall 2008**

- NRF project (*PI: Prof. Jacob Odgaard), Iowa City, IA*
  - *Title:* Sediment Transportation Mechanism for Optimum Design
  - Conducted surface velocity analysis using Particle Image Velocimetry
  - Participated in the River gauging using PIV technique
  - Conducted development of self-cleaning box culver design

PUBLICATION

Peer Reviewed Journal Articles

- **Shim, J.,** Duan, J.G. (2019). "Experimental and theoretical study of bed load particle velocity", *Journal of Hydraulic Research, 57 (1), 62-74*
- **Shim, J.,** Duan, J.G. (2017). "Experimental study of bed-load transport using particle motion tracking", *Int. J. Sedi. Res., 32(1), 73-81*
- Duan, J.G., **Shim, J.**, Jo, H. "Application of SPH model to simulate pier scour in laboratory dam break flow", *J. Hydraul. Eng.,* under review

Research Presentations

- Ahamed, T., **Shim, J.,** Jo, H., Duan, J.G. (2018). "Flood fragility analysis of instream bridges". *Proc., Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, 1059826 (2018), Denver, Colorado*
- Zhou, K., Duan, J. G., Rosenberg, A., **Shim, J.** (2018). "Application of KINEROS2 for Simulating Surface Runoff and Sediment Yield in Desert Watershed". *Proc., World Environmental and Water Resources Congress, 489 -497, Minneapolis, Minnesota*
- Ahamed, T., **Shim, J.,** Jeong, J.H., Jo, H., Duan, J.G. (2017). "Advanced signal processing of sonar measurement for bridge scour monitoring". *Proc., World Environmental and Water Resources Congress,93-100, Sacramento, California*
- **Shim, J.,** Duan, J.G., Jo, H. (2016). "Simulating Sediment Transport around a Bridge Pier using OpenFOAM software". *Proc., World Environmental and Water Resources Congress, 362-369, West Palm Beach, Florida*
- Ahamed, T., **Shim, J.,** Jo, H., Duan, J.G. (2016). "Feasibility Test of Low-Cost Sensors for Bridge Scour Monitoring". *Proc., World Environmental and Water Resources Congress, 78-87, West Palm Beach, Florida*
- **Shim, J.,** Duan, J.G. (2015). "Stochastic Properties of Bed Load Transport.". *Proc., World Environmental and Water Resources Congress, 1841-1850, Austin, Texas*
- **Shim, J.,** Duan, J.G. (2013). "Experimental study of bed load particle velocity". *Proc., World Environmental and Water Resources Congress, 1962-1970, Cincinnati, Ohio*
- **Shim, J.,** Kim, M., Xin, Z., Kim, H. Son, K. (2010). "Analysis of Transverse Structure's Effect in a Channel Flow". *Proc. Korea Water Resources Association (KWRA) Annual Conference. 1961-1964.*
- Cho, H., **Shim, J.,** Kim, M., Kim, H., Xin, Z., (2009). "Sediment Transport Characteristics in a Sewer Line". *Proc. Korea Society of Civil Engineering (KSCE) Annual Conference. 3333-3336.*
- **Shim, J.,** Son, K. (2008). "Sediment Transport Characteristics in a Storm-Sewer Line". *Proc. ICHE Hydro-Science and Engineering Conference*. Nagoya, Japan.

TEACHING

University of Arizona

- **Teaching Assistance**: *Fundamentals of Fluid Mechanics, CE218* — Fall 2016
  - Helped organize discussion/recitation classes, holding office hour grading assignment for the class instructed by Prof. Tribikram Kundu

- **Instructor**, *Fluid Mechanics Laboratory, CE329* — Spring 2013
  - Taught the Fluid mechanics to perform hydraulic experiment
  - Guided the student to implement the hydraulic experiment

Yeungnam University

Teaching Assistance, *Hydraulic Structure Design*
- Helped arrange computer lab classes on HEC-HMS and HEC-RAS, holding office hour, grading assignment and exams — Spring 2010, Spring 2008

Teaching Assistance, *Fluid Mechanics Lab* — Fall 2008
- Assisted the professor with holding office hour grading assignment — Fall 2007

EMPLOYMENT

Korea Water Resources Corporation (K-Water) **August 2010- July 2011**

Engineer, Division of Water Resources Investigation & Planning, Daejeon, South Korea
- Participated in the design of the Smart Survey Vehicle for hydrological data
- Evaluated stability of floodgate in Geum River
- Conducted design of floodgate operation system for barrage structure in Geum River

SKILLS

- Programing skill
  - C, C++, FORTRAN, MATLAB, Python
- Hydraulics and Hydrology software skills
  - HEC-RAS, HEC-HMS, WMS, EPANET, SMS, SWAT, KINEROS
- Simulation technics: CFD, DEM, SPH
  - OpenCV, OpenFOAM, CFDEM, DualSPHysics, LIGGGHTS
- Particle Image Velocimetry (PIV), Particle Tracking Velocimetry (PTV)
- Image Analysis: SfM
- GIS

CERTIFICATES

- Certificate of Engineering Civil Engineering (Class 1), Jun 2006, Korea

AWARDS

University of Arizona **Tucson, AZ, US**

- Outstanding Graduate Student in Civil Engineering & Engineering Mechanic — Spring 2016
- Salt River Project Fellowship, College of Engineering — Fall 2013
- Delbert R. Lewis Graduate Scholarship, College of Engineering — Fall 2012

University of Iowa **Iowa City, IA, US**

- International Research Collaboration Program with IHR (by Ministry of Science and Technology - Korea Research Foundation, $30000 : Only 3 people be selected in the area of Civil Engineers throughout the nation) — Spring 2008
- National Graduate Science and Technology Scholarship — Summer 2007

Yeungnam University **Deagu, South Korea**

- Honor Scholarship/Top 5 of College of Civil Engineering — Fall 2006
- Honor Scholarship of Yeungnam University — Spring 2006
- Honor Scholarship of Yeungnam University — Fall 2005