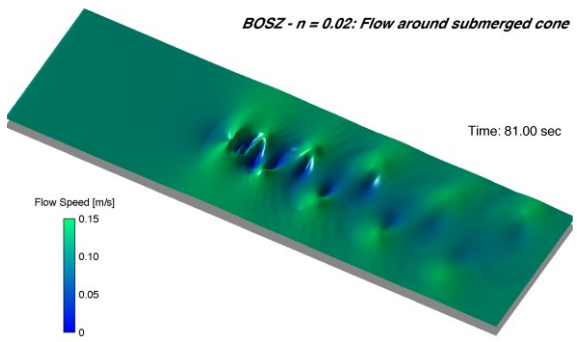
National Tsunami Hazard Mitigation Program – Mapping & Modeling Benchmarking Workshop (2015/2/9-10)

Theme：Numerical modeling, tsunami, hazard mitigation
Location：Portland, Oregon, USA
Link: http://nws.weather.gov/nthmp/2015annualmeeting/index.html

On February 9-10, 2015, IRIDeS staff member Volker Roeber (Assistant Professor, Hazard and Risk Evaluation Research Division) attended the 2015 NTHMP mapping & modeling benchmarking workshop. The workshop was part of the annual NTHMP meeting and was organized by Rick Wilson and Pat Lynett. This years' workshop focused on currents and flow velocities from tsunami waves to improve mariners' safety and assess hazard potentials around harbor facilities.
To help produce accurate and consistent maritime hazard products, the new FY13-17 National Tsunami Hazard Mitigation Program (NTHMP) Strategic Plan includes a requirement of the Mapping and Modeling Subcommittee to also develop and run a benchmarking workshop to evaluate the numerical tsunami modeling of currents. As a result of the 2-day workshop, modelers will have a better awareness of their ability to accurately capture the physics of tsunami currents, and therefore a better understanding of how to use these simulation tools for hazard assessment and mitigation efforts.
For this workshop, five different benchmarking datasets have been organized. These datasets have been selected based on characteristics such as geometric complexity, currents that are shear/separation driven (and thus are de-coupled from the incident wave forcing), tidal coupling, and interaction with the built environment. While tsunami simulation models have generally been well validated against wave height and runup, comparisons with flow speed data are much less common. As model results are increasingly being used to estimate or indicate damage to coastal infrastructure, understanding the accuracy and precision of speed predictions becomes important. Volker Roeber has run three benchmarking cases with his Boussinesq model, BOSZ. The benchmark problems include:

1. Uniform current over submerged conical island (lab experiment)
2. Tohoku tsunami waves in Hilo Harbor (field data)
3. Solitary wave propagation over shelf (lab experiment)

The BOSZ model performed well in reproducing the free surface and current envelopes from all benchmark tests. In comparison to other models, BOSZ showed little grid sensitivity and numerical diffusivity. Though the performance was satisfying, the model is currently updated with a more accurate numerical discretization technique as part of a collaborative effort with the Department of Ocean & Resources Engineering at the University of Hawaii.



Benchmark test #1:
Flow over shallow submerged cone. The flow shows mean- dering of a vortex street at the lee side of the cone as result of shear instability. The oscillatory pattern is strongly dependent on the local water depth, the flow speed, as well as bottom friction. Excessive numerical diffusion would prevent this pattern from occurring.
Snapshot from BOSZ model.

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