

RESEARCH ON SWASH SEDIMENT TRANSPORT AND OCEAN ENERGY UTILIZATION

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Keywords Swash sediment transport, runup waves, seepage flow, ocean current energy

Technical Support Skills

- Coastal topography and sediment transport
- Coastal disaster prevention and protection
- Ocean power(energy) utilizing system



Research Contents

Research Theme I : Prediction of swash sediment transport considering unconfined groundwater flow

Numerical simulations are performed to predict sediment transport affected by saturation of a beach slope in the swash zone. The wave transformation and groundwater flow are estimated using the Reynolds model describing the average motion of turbulent flow coupled with the saturated-unsaturated seepage flow model. The advection diffusion model is used to compute the transport of suspended sediment in the swash zone. Nielsen formula, which estimates the pickup rate of sediment, is applied as the bottom boundary condition. The infiltration-exfiltration effects are quantified through a permeable Shields parameter. The comparison between present model results and visualization experimental data of suspended load show that, in the any cases of sand grain size, the characteristics of sediment transport due to saturation of a beach slope can be evaluated with very good accuracy.

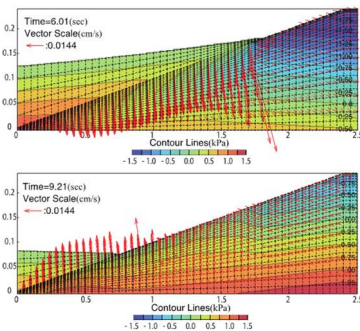


Fig Present model result (velocity distribution)

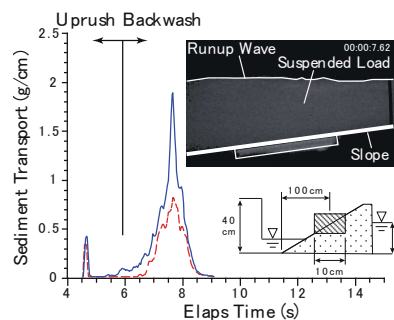


Fig Visualization experiment of suspended load

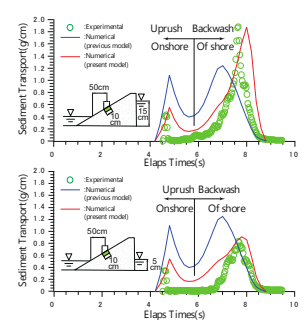


Fig Comparison between Num. and Exp.

Research Theme II :Development of power generation due to ocean and tidal current in Tsugaru Strait

Water current characteristics and energy potential in Tsugaru Strait are investigated through field observation and numerical simulation. The energy potential distribution estimated from the analysis results indicates that the most appropriate location of power generation is around the side of Shimokita Peninsula. Power generation function mounted on flaring flanged diffuser is examined using three dimensional current flume. Based on the result of experiments, amount of power generation in Tsugaru Strait is calculated to be 10~100W/unit at the actual place.

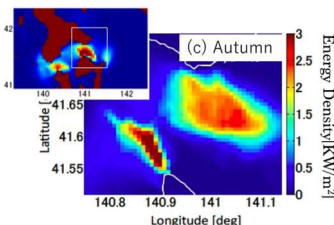


Fig Potential energy distribution

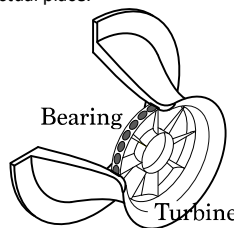


Fig Power generation device

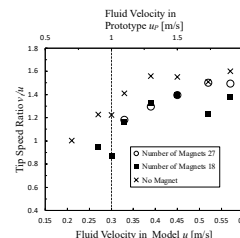


Fig Characteristic of TSR

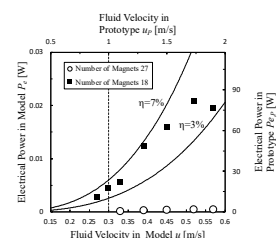


Fig Estimated Power Generation

Available Facilities and Equipment

Sloable Two-Dimensional Water Flume

Two-Dimensional Water Channel with Wave Maker

Reynolds Experiment Device