

Combined Physical and Numerical Study of an Artificial Coastal Reef Valeri

Penchev, Senior Res. Sc. (office@bshc.bg)

Experimental tests have been carried out under a wide range of irregular and regular incident wave conditions in the WKS wave flume of the Franzius Institute. Numerical test included application of SWAN wave model, MIKE'21 simulation system and other specific software.

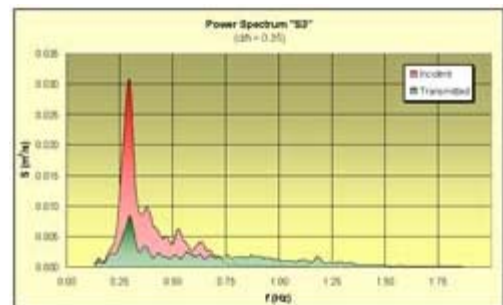


construction design of artificial rubble-mound

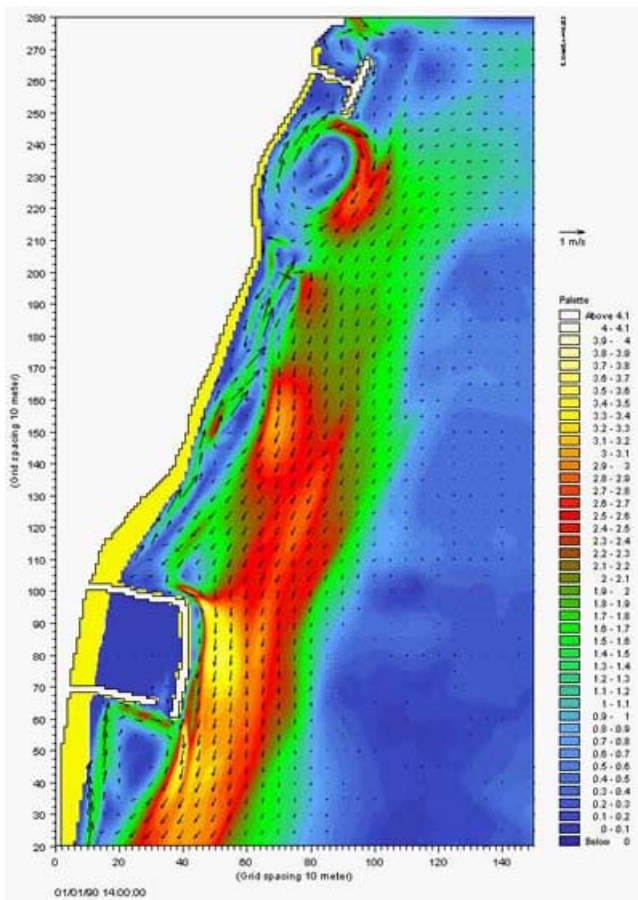
More than 100 experimental runs have been carried out. Test data upon dynamic water level variations, wave-induced set-up, orbital wave velocities and bottom velocities have been recorded. Test data have been processed and analyzed.

Some basic results upon the influence of reef's properties on the hydrodynamic and morphology changes in the protected area (the beach) have been obtained. These results could serve as basic criteria for The results obtained have been also used for further numerical simulations of the sediment transport. A series of numerical

reefs for the conditions of a closed sea (Black Sea).



models were set up and calibrated against selected field data and physical model tests for analyzing the processes of sedimentation/ erosion near the artificial reef (i.e. wave climate, current velocities, sediment transport rates and bed level changes). Radiation stresses were calculated by SWAN numerical wave model (TU-Delft, The Netherlands). Results obtained were used as input for the MIKE21 HD-Hydrodynamic module (DHI, Denmark). MIKE21 HD-module results (i.e. water depths, wave-current velocities) with sediment data were used for the sediment transport simulation (MIKE21 ST-module). A numerical parameter study on the influence of wave induced currents on sediment transport, and sedimentation and erosion processes was performed. Main results of the research are published at the 22 International Conference HADMAR 2001, October 2001, Varna, Bulgaria.



REFERENCE:
2001 Euro-Conference, Varna.

Penchev, V., Dragancheva, D., Matheja, A., Mai, S., Geils, J., 2001, "Combined Physical and Numerical Modeling of an Artificial Coastal Reef", Proceedings of HADMAR