Dipartimento di Ingegneria Civile, Edile e Architettura



SEMINAR ANNOUNCEMENT

Wave-structure interaction: numerical approach

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Shallow water model in a weakly nonlinear formulation is implemented, in order to investigate long wave features in coastal areas. The numerical method, based on finite difference, is outlined, and some results are discussed: wave-groin and wave-reef interaction are shown. Short wave properties are investigated as well, in the framework of the potential flow model, numerically solved by means of Boundary Element Method. Linear and fully nonlinear free surface conditions are implemented, and wave diffraction/refraction past a shoal is investigated, by comparison between numerical results and classical experimental data. Finally, some numerical computations are outlined to investigate the submerged flat plate behaviour. From an environmental point of view, one of the most interesting features of this kind of non-conventional breakwater is that it does not induce the undesired stagnation zone along the coast typical of the most common marine structures. Numerical results of linear and nonlinear computations are compared to numerical and experimental data available in literature. The influence of the geometric configuration of the plate on the transmission coefficient for waves of varying length is evaluated.

Francesco Lalli, formerly Research Director at the Higher Institute of Environmental Protection and Research (ISPRA), coordinated research activities for the development of tools for the monitoring and analysis of sea and coastal state scenarios, for the simulation of hydrodynamic, transport and coastal flooding phenomena, also taking into account water quality aspects and the interactions between biotic and abiotic processes. He managed the application of European directives regarding both sea and coasts. provided technical-scientific support to state administrations and local authorities in the context of the National Environmental Protection System, regarding problems related to the physical and quality aspects of marine-coastal waters and coastal erosion, even in emergency situations. He carried out research activities concerning flows in porous media, was interested in magneto-hydrodynamic flows, in numerical and experimental methodologies for the determination of the hydrodynamic resistance of hulls, in the study of the barotropic and baroclinic instability of cyclonic/anticyclonic structures, in the interaction between wave motion and marine structures, sedimentary dynamics using continuous medium models, in LDA, PIV and PTV experimental methods for the study of wave motion in the laboratory and in the field, numerical methods for the study of river mouths, jet-wall interaction, environmental effects of maritime works, guality of coastal waters, flooding phenomena. He produced around 90 publications in international and national journals, conference proceedings and technical reports.

All interested people are invited to attend the seminar, in particular Master students in Environmental and Civil Engineering, PhD students and researchers in water science and engineering.