Advanced Environmental Coastal Engineering

(1) Name of Lecturer: Ioan NISTOR

(2) Position: Associate Professor and Vice-Dean Graduate Studies

(3) Affiliation: Department of Civil Engineering, University of Ottawa, CANADA

(4) Short Biography: Dr. Ioan NISTOR is an Associate Professor of Hydraulic and Coastal Engineering in the Department of Civil Engineering of the University of Ottawa, Canada, and Vice-Dean (Graduate Studies) of Faculty of Engineering. Dr. Nistor is a coastal and hydraulic engineer researching hazards associated with extreme hydrodynamic loading on infrastructure (tsunami impact on infrastructure, extreme wave and flood forces on structures, dam failure phenomena, etc.) and he is currently the Vice-Chair of the Maritime and Coastal Division of International Association for Hydro-Environment Engineering and Research (IAHR) and a member of the Board of Directors of the Canadian Coastal Science and Engineering Association. He is also a voting member of the new ASCE7 Subcommittee for the elaboration of New Design Guidelines for Tsunami-Resistant Buildings. Dr. Nistor is also an Associate Editor of the Coastal Engineering Journal (JSCE – Japan), of the Canadian Journal of Civil Engineering (CSCE-Canada), and of the Journal of Waterways, Ports, Coastal and Ocean Engineering (ASCE – United States). He is the winner of several research and teaching awards: 2010 Award of the Tsunami International Society, 2010 Excellence in Education Award of the University of Ottawa, 2009 John V. Marsh Teaching Award of the Faculty of Engineering, 2005 Ontario Ministry for Infrastructure Renewal.

(5) Subject and Schedule of the Lectures:

The following lectures were offered as a part of the course “Environmental Coastal Engineering” offered in the Department of Civil and Environmental Engineering of Hiroshima University.

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The first lecture contains an introduction on coastal modeling, with various examples of research projects in coastal and hydraulic engineering. The second lecture dealt with a comprehensive presentation of the engineering lessons drawn from a post-tsunami forensic investigation of the impact of the 2011 Tohoku Tsunami on the built infrastructure along the Sanriku coastline in Japan.

Lecture three is dealing various basic wave theories, particularly linear wave theory. The lectures are specially designed for coastal engineers, but any regular graduate civil engineering student with a reasonable background in mathematics, fluid mechanics and hydraulics can follow the lectures.

Lecture four deals with the nearshore wave transformation (diffraction, refraction, shoaling, etc) and wave breaking in the surfzone.


Scaling relationships
For free surface flows, ensure Fr is the same in the model as in the prototype + ensure Re is sufficiently large
Scaling relationships, n = prototype value / model value
Length $l_p = l_m * n$
Fr $Fr_p = Fr_m$
Gravity $g_p = g_m$
Velocity $v_p = v_m \sqrt{n}$
Time $t_p = t_m \sqrt{n}$
Force $F_p = F_m * n^3$
Area $A_p = A_m * n^2$
Pressure $P_p = P_m * n$
Discharge $Q_p = Q_m * n^{2.5}$
Large scale models are generally better and
but are also more expensive
CHC
Fr>1 supercritical
Fr<1 subcritical
turbulent / laminar