Nonlinear Ocean Surface Wave Mechanics

Georgia Institute of Technology, Savannah Campus

Instructors: Dr. Kevin Haas, Dr. Hermann Fritz
Office: PARB Bldg, Georgia Tech Savannah, 210 Technology Circle, Savannah, GA 31407
Contact info: http://webct.gatech.edu (webct accounts),
kevin.haas@gtsav.gatech.edu, Phone: (912)-966-7929, Fax: (912)-966-7836
hermann.fritz@gtsav.gatech.edu, Phone: (912)-966-7947, Fax: (912)-966-7836

Office Hours: flexible upon demand

Class Meeting: MWF 1:05-1:55, PARB 127

Prerequisites: CEE 6251 Intermediate Fluid Mechanics, CEE6810 Linear Ocean Surface Wave Mechanics or equivalent.

Text: **Introduction of Nearshore Hydrodynamics. Ib A Svendsen, World Scientific, 2006 ISBN 981-256-204-4 (pbk)**

Homework: Homework assignments will be made available via http://webct.gatech.edu. Late homework will not be accepted without a valid excuse. You are encouraged to work in groups, but independent homework solutions must be submitted.

Term-projects: The term project will consist of original research on a subject related to nearshore hydrodynamics. Topics related to students ongoing research interests are highly encouraged. A 1-2 page proposal about the project topic will be due the fourth week. An outline of the project including a thorough literature review about previous work related to the topic will be due the eighth week of the semester. The final project is due at the end of the semester consisting of a 20-minute oral presentation to the class and a 10-page written paper.

Grades: Your final grade will be based on the term project and homework assignments.
Graded papers will be made available via http://webct.gatech.edu.

Honor Code: This course will be conducted under the guidelines of the Georgia Tech Academic Honor Code.

Course Outline: The course will give an introduction to state-of-the-art of nonlinear wave theories and applications. The topics include perturbation methods, solitary and cnoidal waves, shallow water waves (Boussinesq, KDV equation), deep water waves (Stokes Theory), wave-wave interactions and stream function theory for water waves.

Weeks (15 total)	lectures	Topic	Instr.
1-3	9	• Overview of non-linear wave theories, governing equations, scaling • Perturbation methods, pendulum example, Lindstedt's technique, multiple scale approach, WKB Expansion	KH
4-8	15	• Shallow water waves • Boussinesq-equations • Cnoidal and Solitary waves	HF
9-13	15	• Deep water waves, Stokes waves • Wave-wave Interactions, double pendulum example, capillary 2^{nd} harmonic resonance, shallow water 3-wave resonance, deep water 4-wave resonance	KH
14-15	6	• Stream function theory for solving nonlinear waves equations	HF