

# Department of Ocean & Resources Engineering

*Seminar*

## NONLINEAR HYDROELASTICITY OF MAT-TYPE VERY LARGE FLOATING STRUCTURES (VLFS) IN SHALLOW WATER: THE GREEN-NAGHDI THEORY

by

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### **Abstract**

The 2-D nonlinear hydroelasticity of a mat-type VLFS is studied in the scope of linear beam theory for the structure and nonlinear Green-Naghdi theory for the fluid. The beam equation and Green-Naghdi equations are coupled through the kinematic and dynamic surface boundary conditions. Because the top surface of the fluid layer is discontinuous across the edge of the floating structure, jump conditions are necessary to connect the solutions in the open water region and those under the structure. A set of jump conditions is derived through the use of the conservation laws of mass, momentum and mechanical energy. The numerical model is used to study the hydroelastic response of a VLFS exposed to solitary or cnoidal waves. Good agreement is observed between the present results and other published results. The comparisons of the linear and nonlinear results are also discussed.