1052-76-214 **Katie L. Oliveras*** (katieoliveras@gmail.com) and **Bernard Deconinck** (bernard@amath.washington.edu). *Stability of stationary periodic solutions of the Euler equations.*

Euler's equations describe the dynamics of gravity waves on the surface of an ideal fluid with arbitrary depth. In this talk, We discuss the stability of one-dimensional traveling wave solutions to the full set of Euler equations via a generalization of a nonlocal formulation of the water wave problem due to Ablowitz, Fokas and Musslimani. Transforming the non-local formulation into a traveling coordinate frame, we obtain a new equation for the stationary solutions in the traveling reference frame as a single equation for the surface in physical coordinates. Using this new equation, we develop a numerical scheme to determine traveling wave solutions by exploiting the bifurcation structure of the non-trivial periodic solutions. Finally, we determine numerically the spectral stability for the periodic traveling wave solution by extending Fourier-Floquet analysis to apply to the non-local problem. We generate the full spectra for various traveling wave solutions. In addition to recovering past well-known results such as the Benjamin-Feir instability for deep water, We confirm the presence of high-frequency instabilities for shallow water. (Received August 28, 2009)