1137-65-214 **Robert L. Higdon*** (higdon@math.oregonstate.edu), Department of Mathematics, Kidder Hall 368, Oregon State University, Corvallis, OR 97331-4605. *Automatic Well-Balancing in a Formulation of Pressure Forcing for Discontinuous Galerkin Modeling of Oceanic Flows.*

During the development of a Galerkin numerical method, a beginning step is to multiply by a test function and integrate by parts. The goal of the present talk is to show that this process can be used to overcome a standard difficulty that is encountered with the shallow water equations, a system of partial differential equations that arises in various circumstances in geophysical fluid dynamics. In the case of variable bottom topography, the usual formulation of this system includes a static forcing term that must be implemented carefully in order to avoid spurious forcing. Such forcing could, for example, cause the fluid to start moving in circumstances when it should remain at rest, and in that event the forcing is not "well-balanced". With an alternative that is developed here for Discontinuous Galerkin (DG) methods, the plan is to re-visit the derivation of the shallow water equations from physical principles. At a certain step in that derivation, proceed directly to a weak Galerkin form by multiplying by a test function and integrating over the water column that lies on a given horizontal grid element. The resulting formulation is automatically well-balanced. (Received February 04, 2018)