

## Special Program in Applied Mathematics and Applied Mechanics

*The dynamics of estuarine fronts and river outflows*

2014 - 04 - 30 (Wed.)

10:30 - 12:00

308, Mathematics Research Center Building (ori. New Math. Bldg.)

---

Estuaries are transition zones between seawater and fresh water. In many estuaries, this transition does not occur smoothly or gradually, but rather it occurs in distinct frontal zones, in which the gradients are concentrated within scales much smaller than the overall dimensions of the estuary. Estuarine fronts tend to be generated during the ebb tide, in association with lateral constrictions and expansions of the estuarine width. The constrictions accelerate the flow and cause it to become hydraulically supercritical, and the supercritical flow tilts strongly upward, evolving into a front if there is adequate mixing upstream to collapse the lower layer. In estuaries with strong river outflows, there is only one front—the “lift-off” front that occurs at the mouth and extends into the river plume. In estuaries with lower river discharge, multiple fronts may occur within the estuary, each forming at a different constriction along the estuary. During the flood tide, the fronts propagate into the estuary as frictionally influenced gravity currents. In front-dominated estuaries, the tidally averaged estuarine circulation can be regarded as the superposition of arrested and propagating fronts.



**CASTS**

Center for Advanced Study in Theoretical Sciences, NTU