**CME 193 Final project proposal**

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Nowadays numerical simulation method has already become one of the most effective ways to study hydrodynamic problems of ocean, estuaries and rivers. It can be applied to simulate free surface and velocity field under varied conditions, and further extended to the problem of salinity or contaminant transport, and even sediment transport. Therefore, for this final project, we will generate a python code to simulate 2D (x,z) velocity field and salinity field for a river with flat bottom under tidal and inflow boundary conditions.

Although the realistic problem for river flow is totally a 3D problem, if the width of river is large enough, we can ignore the drag effects from riverbanks, and treat the river as a 2D case. In this project, a structured quadrilateral staggered grid will be generated and used to simulate river flow field. The other parameters like bottom roughness, the number of vertical layers, time step size, boundary flow rate, can all be set individually. At last, the project will also plot the results out for every time step and to show the salinity field.