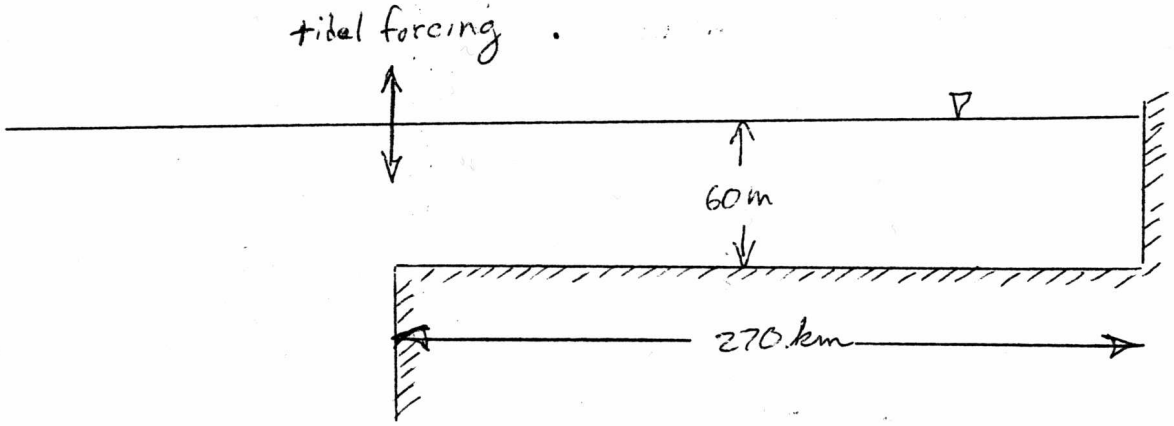
GEO 5500 Numerical Methods in the Geosciences
Computer Assignment #11
Hyperbolic Finite Difference Methods

Assigned: April 14, 2005
Due: April 26, 2005

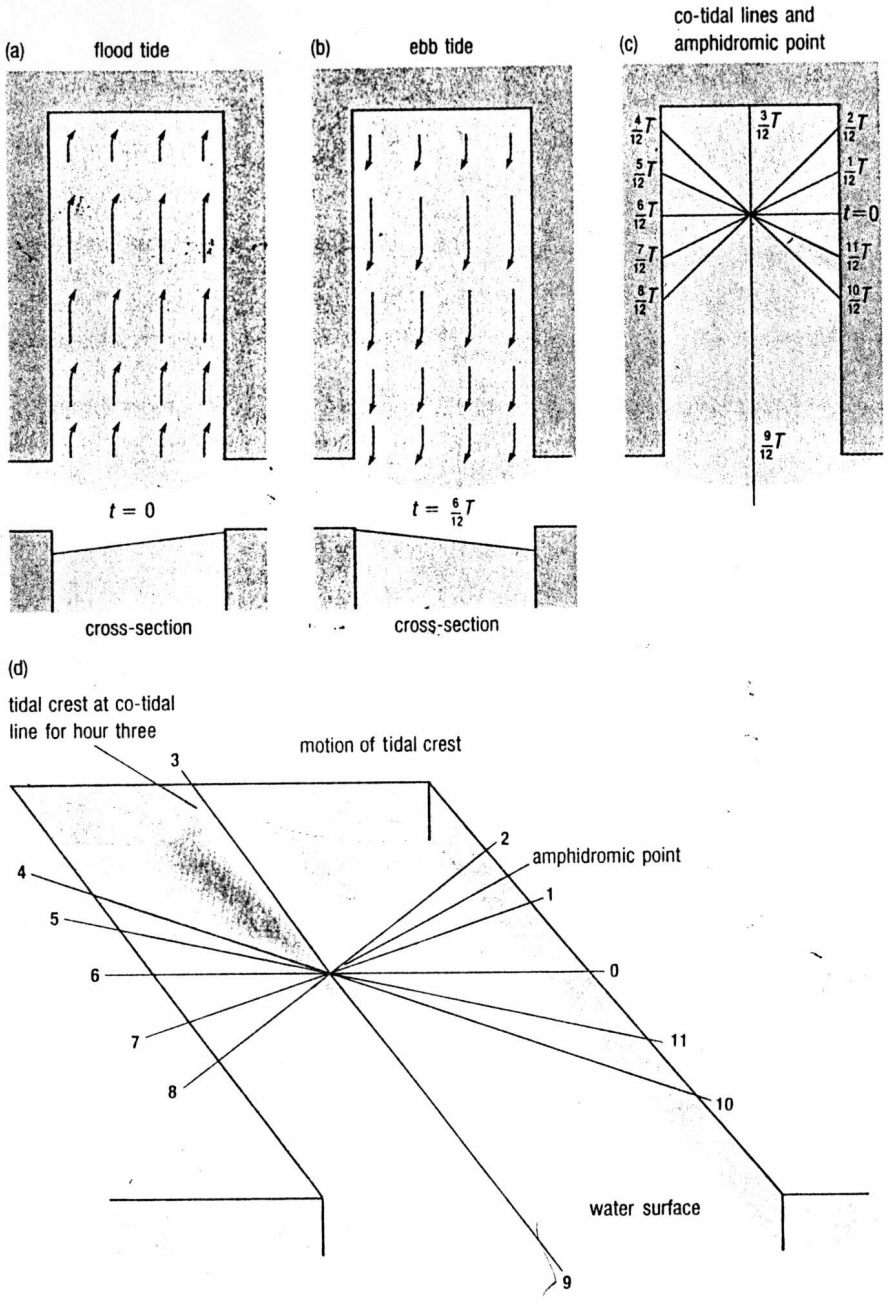
The Bay of Fundy is approximately 270 km long and has an average depth of 60 m. The principle lunar (M2) tide worldwide is 12.42 hours. (See attached handout).

For a bay that is open on one end, the resonant period, T, is $T = 4L/(gH)^{1/2}$ where L is the length of the bay and H is the water depth.

For this assignment you will use the Matlab function "fwave" to investigate the behavior of tides in the Bay of Fundy. The basic dimensions and boundary conditions for the problem are shown below:



The fwave function requires as input (1) initial position, (2) initial slope, (3) two boundary conditions, and (4) velocity. Carefully consider the appropriate values for each of these. Investigate a variety of bay lengths (perhaps 200, 235, 270, and 305 km) and use the "subplot" command to show the results.



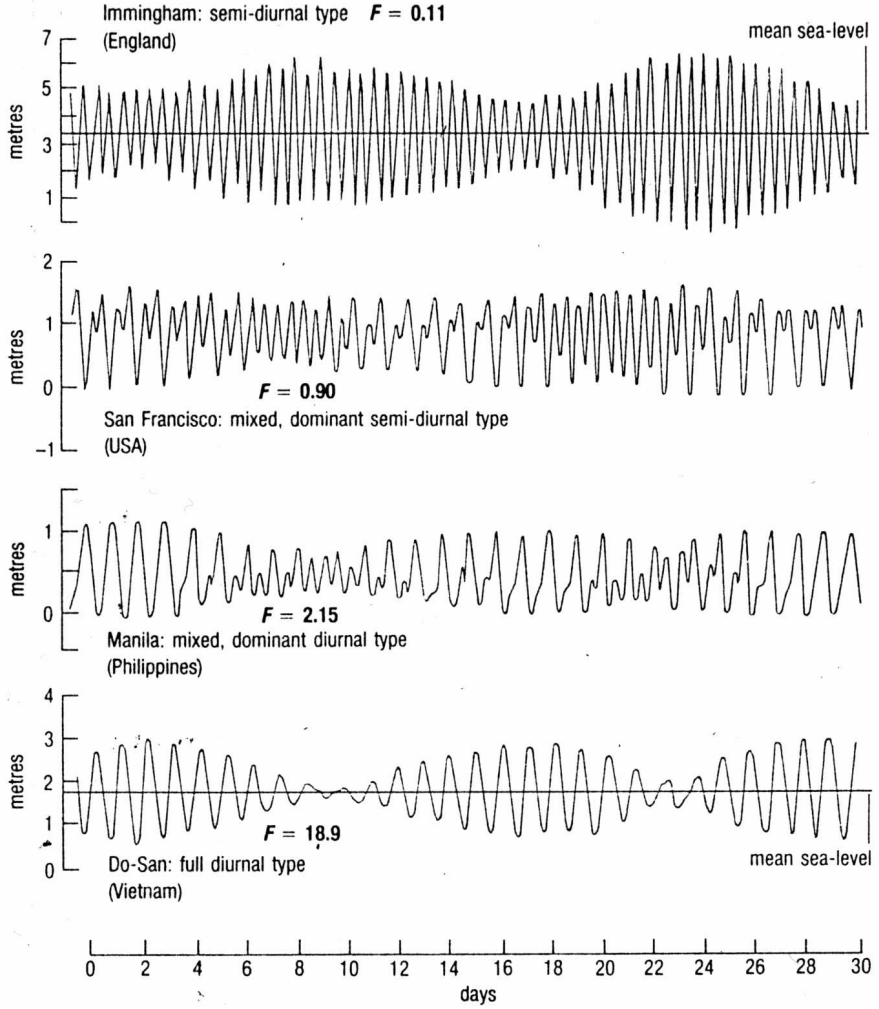


Table 2.1 Some principal tidal components.

Name of tidal component	Symbol	Period in solar hours	Coefficient ratio ϒ(M_2 = 100)
Principal lunar	M_2	12.42	100
Principal solar	S_2	12.00	46.6
Larger lunar elliptic	N_2	12.66	19.2
Luni–solar semi-diurnal	K_2	11.97	12.7
Luni–solar diurnal	K_1	23.93	58.4
Principal lunar diurnal	O_1	25.82	41.5
Principal solar diurnal	P_1	24.07	19.4
Lunar fortnightly	M_f	327.86	17.2
Lunar monthly	M_m	661.30	9.1