# Analytical solution of tidal forcing in a rectangular 2D basin

Governing equation in 2D (X-Z):

1-Continuity

Assumptions:

* u, is not function of z but vertical velocity w is a function of z
* H is constant
* Ζ << H

2- Momentum

Assumptions:

* Inviscid fluid ( interfacial and bottom friction are neglected)
* Ρ=constant
* Non-rotating reference frame (f=0)

Integration will result in:

Subjected to the boundary condition u(L,t)=0

K0 must be calculated base on boundary conditions

@t=0 :

and x0=1 domain from 1 to L?????

If L = 409600 m , H = 16m, g =9.8, a=0.5 m and ω=2pi/12.4 hr =0.506708 1/hr

A=0.4188704167062 and B=0.040465522644

K0= 2.0680331617614\*…=10.066637844459

[x(t=0)=1]

So in the case of pure advection (no diffusion) the code should yields

C(x(t),t) = C(x0=1,0)

Flow must be (analytical solution) :

U\*Area