

SYazdi@kntu.ac.ir

Hamed_Arabi1@yahoo.com

Archive of SID

()

()



Archive of SID

(Kranenburg, 1992-Liggett and Hadjithodorou, 1969-Finegan and Hartnett, 2002-Kocyigit and Falconer, 2002-Quamrul and Blumberg, 1999)

$$\frac{\partial}{\partial t}(h) + \frac{\partial}{\partial x}(hu) + \frac{\partial}{\partial y}(hv) = 0 \quad (1)$$

(Sabbagh Yazdi et al 2004)

$$\frac{\partial}{\partial t}(hu) + \frac{\partial}{\partial x}(hu^2) + \frac{\partial}{\partial y}(huv) + gh \frac{\partial}{\partial x}(h+z) = -gh\tau_{sx} \quad (2)$$

$$\frac{\partial}{\partial t}(hv) + \frac{\partial}{\partial x}(huv) + \frac{\partial}{\partial y}(hv^2) + gh \frac{\partial}{\partial y}(h+z) = -gh\tau_{sy} \quad (3)$$



y x

y x t

z h

y x

y x

v u

τ_{sy} τ_{sx}

$$\tau_{sx} = (\rho_w / \rho_a) C_w W_{x10} |W_{10}| \quad , \quad \tau_{sy} = (\rho_w / \rho_a) C_w W_{y10} |W_{10}| \quad ()$$

ρ_a ρ_w
 W_{y10}, W_{x10} C_w

$|W_{10}|$ y ,x

()

Archive of SID

(Smith and Banke, 1975)

$$W_i^{n+1} = W_i^n - \frac{\Delta t}{A_i} \left[\sum_{j=1}^m (\bar{E} \Delta y - \bar{F} \Delta x) - A_i \tau_{s\zeta} \right]$$

W_i^{n+1}

hu

h

W

W_i^n

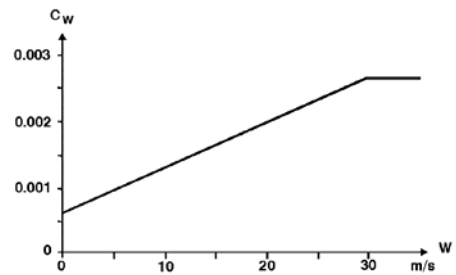
hv

A_i

F E

m

()



C_w : ()
 (Smith and Banke, 1975)

(hv hu h) W



$$\Delta t = \frac{A}{\lambda} \quad (1)$$

A

λ

λ

$$\Delta t \quad (2)$$

$$\lambda = |\vec{U} \cdot \hat{n}| + \sqrt{U^2 + C^2(\Delta x^2 + \Delta y^2)}$$

$C \quad \vec{U} \cdot \hat{n}$

$C \quad \vec{U} \cdot \hat{n}$

$$\vec{U} \cdot \hat{n} = |\bar{u}\Delta y - \bar{v}\Delta x| \quad (3)$$

$$C = \sqrt{gh} \quad (4)$$

g

Δt

()

$$W_i^{n+1} = W_i^n - \frac{\Delta t}{\Omega_i} \{ [C(W_i^n) - D(W_i^n)] + A_i \tau_{s\zeta} \} \quad (5)$$

$$\alpha_h = [\sum (h_i - h_j)] / \sum h_j \quad D(W_i) \quad C(W_i)$$

$$C(W_i^n) = \sum_{j=1}^N (\bar{F}\Delta y - \bar{G}\Delta x)_j \quad (6)$$

$$(0 < \alpha_h < 1)$$

()

$$D(W_i) = \lambda_{ij} [\varepsilon_4 (\alpha_h \nabla^2 W)_i - \varepsilon_2 (\nabla^4 W_i)]$$



$$\varepsilon_2 \quad \varepsilon_4$$

$$0.2 \leq \varepsilon_4 \leq 0.3$$

Wu, 2004)

$$1/256 \leq \varepsilon_2 \leq 3/256$$

(Balzano, 1998

ε

W_i

:

$$\nabla^2 W_i = \sum_{j=1}^{Ne} (W_j - W_i) \quad ()$$

$Ne \quad i \quad j$

$W_i \quad \nabla^2 W_i$

$$\nabla^4 W_i = \sum_{j=1}^{Ne} (\nabla^2 W_j - \nabla^2 W_i) \quad ()$$

λ_{ij}

(h_1)

)

h_2

$h_2 \quad h_1$

$$0 < (f = ah + b) < 1$$

$$a = 1/(h_2 - h_1) \quad ()$$

$$b = -h_1/(h_2 - h_1)$$



$$f = 0 \quad h = h_1$$

$$f = 1 \quad h = h_2$$

()

$h_2 \quad h_1$

() h_1

Archive of SID

()

c_ω

l ()

()

()

()

()

Kranenburg, 1992)

(Liggett &

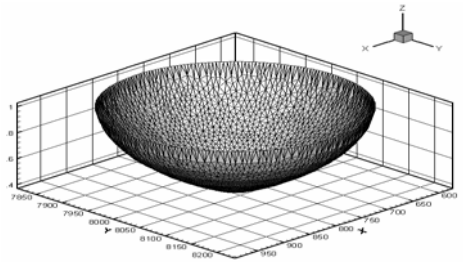
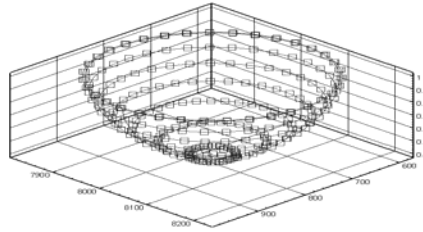
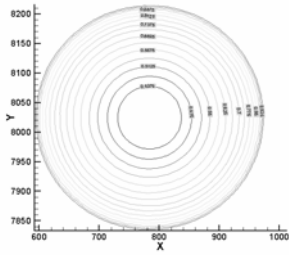
()

1- Hadjithodorou, 1962

1- Sabbagh Yazdi et al 2004
 2- Liggett and Hadjithodorou 1969
 3- Smith and Banke, 1975
 4- Weatherill et al 1994

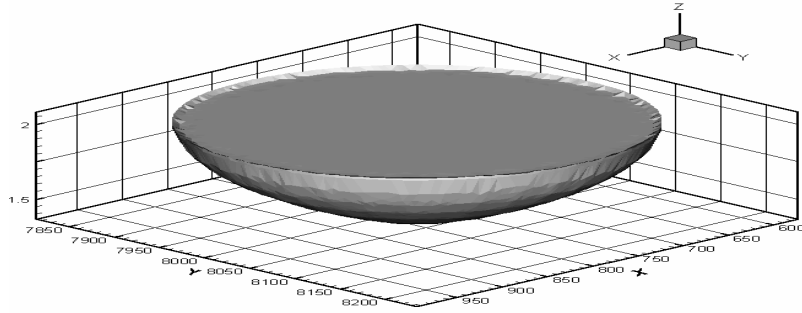


()

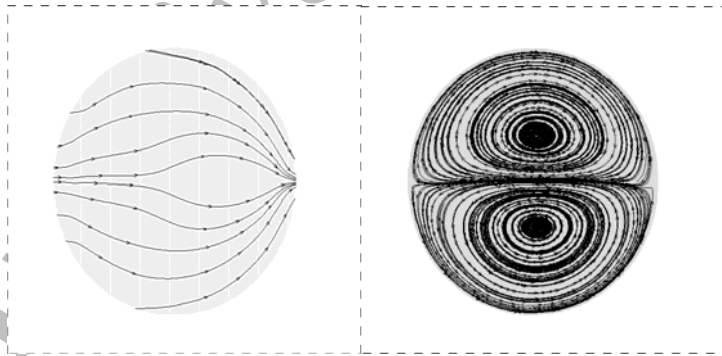


()

:()

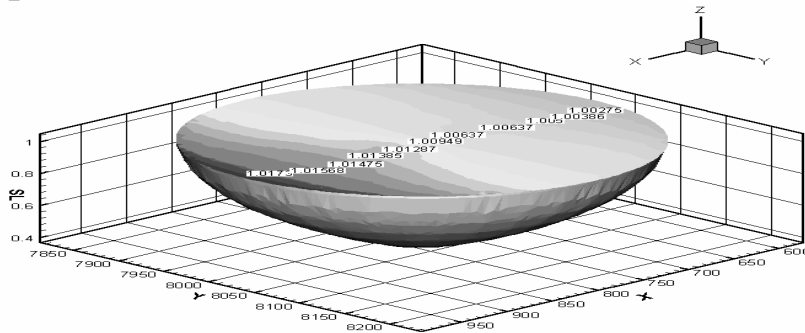


:()

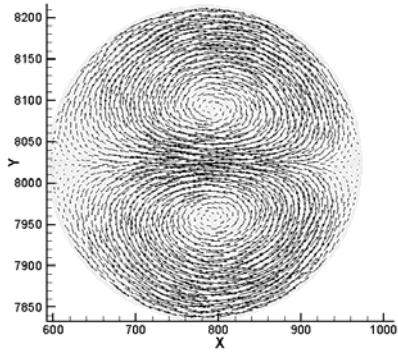


(: :)

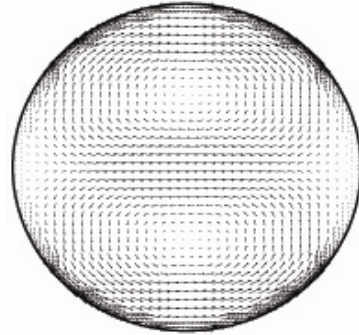
:()



:()

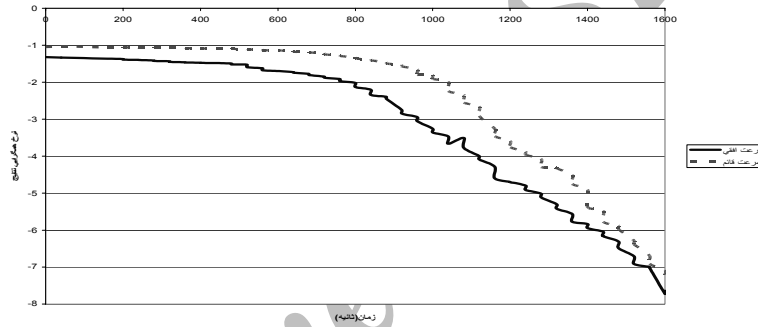


:()



:()

Liggett and Hadjithodorou 1962



()

:()

Archive

()

)

(



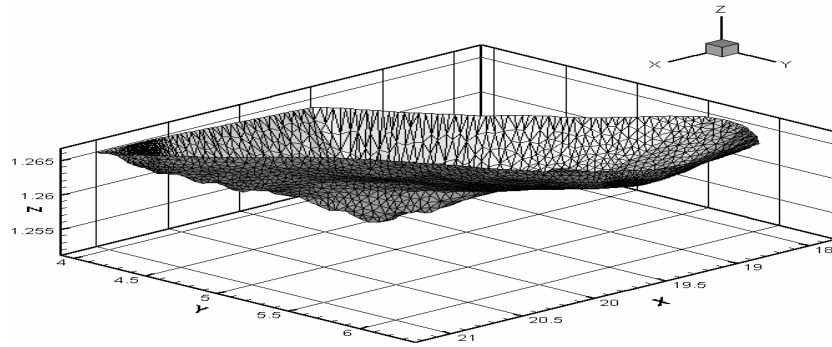
()

l c_{ω}

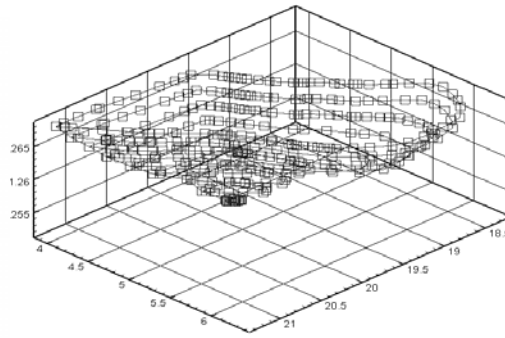
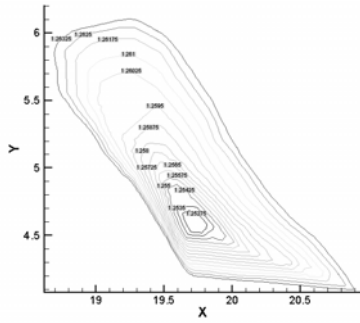
()

()

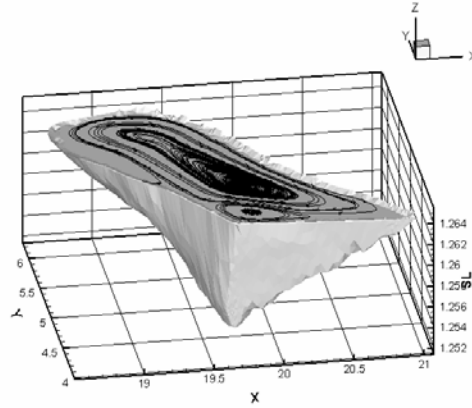
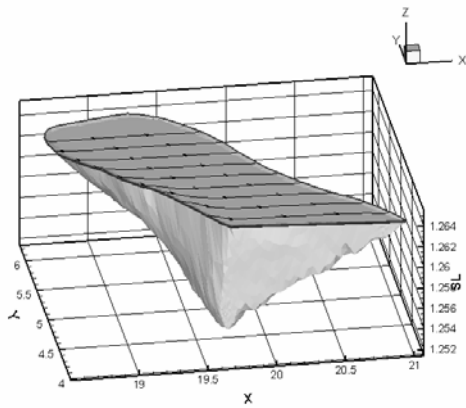
Archive of SID



: ()



: ()



(: :)

: ()

()

Reference

1. Balzano A., 1998, *Evaluation of Numerical Simulation of Wetting and Drying in Shallow Water Flow Models*. *Costal Engineering*, Vol. 34, 83-107
2. Borthwick A. G. L., 2001, *Adaptive Quadtree Model of Shallow Flow Hydrodynamics*, *Journal of Hydraulic Research*, Vol. 39, No. 4, 416-431
3. Jozsa J., Sarkkula J. & T. Kramer, 1998, *Recent Development in Hydro and Sediment Dynamics Research of Shallow Hongrian Lakes*, *Conference on Hydro Science and Engineering*, Cottbus, Germany, CD-ROM.
4. *Forces on the Caspian Sea Currents Using a Two Dimensional Numerical Model*, *5th International Conference of Cost-Ports and Marine Structures*, Ramsar, Iran, 25-29.
5. Kranenburg C., 1992, *Wind-Driven Chaotic Advection in a Shallow Model Lake*, *Journal of Hydraulic Research*, Vol. 30, No. 1, 29-47
6. Liggett J. A. & Hadjitheodorou C., 1969, *Circulation in Shallow Homogenous Lakes*, *Journal of Hydraulics Division, ASCE, HY-2*, 609-620.
7. Sabbagh Yazdi, S.R., and MohammadZadeh, M., 2004, *Finite Volume Solution of Two Dimensional Convection Dominated Sub-critical Free Surface Flow Using Unstructured Triangular Meshes*, *International Journal of Civil Engineering*, Vol. 2, No. 2.
8. Sabbagh Yazdi S. R., 2002, *Investigation of Coriolis Weiming Wu*, 2004, *Depth-Averaged Two-Dimensional Numerical Modeling of Unsteady Flow and Non-Uniform Sediment Transport in Open Channels*, *Journal of Hydraulic Engineering, ASCE, OCTOBER2004*, 1013-1024
9. Sabbagh Yazdi, Saeed Reza, 1997, *Simulation at the Incompressible Flow Using Artificial Compressibility Method*, Ph.D. Thesis, University of Walse, Swansea