

علوم و تکنولوژی محیط زیست ، شماره ۲۶ ، پاییز ۸۴

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(Kranenburg, 1992-Liggett and
Hadjitheodorou, 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}

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

$$\rho_a \quad \rho_w$$

$$W_{y10}, W_{x10} \quad C_w$$

$$|W_{10}| \quad y, x$$

C_w

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(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

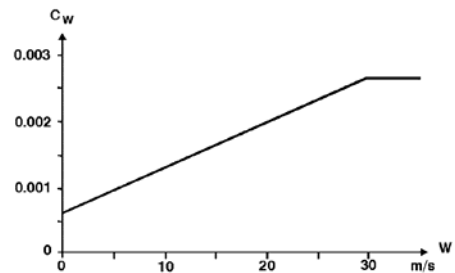
hv

A_i

F E

m

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C_w

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(Smith and Banke, 1975)

(hv hu h) W



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

A

λ

λ

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

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

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

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

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

$$C = \sqrt{g\bar{h}} \quad (4)$$

g

Δt

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

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

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

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

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



$$\varepsilon_2 \quad \varepsilon_4$$

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

Wu, 2004)

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

(Balzano, 1998

ε

W_i

:

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

$Ne \quad i \quad j$

i

$$W_i \quad \nabla^2 W_i$$

)

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

λ_{ij}

$(h_1 \quad)$

i, j

) ()

(

$\lambda \quad \lambda_{ij}$

h_2

$\lambda \quad i$

)

()

(

$h_2 \quad h_1$

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

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

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



$f = 0$

$h = h_1$

$f = 1$

$h = h_2$

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$h_2 - h_1$

$() h_1$

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c_ω

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Kranenburg, 1992)

(Liggett &

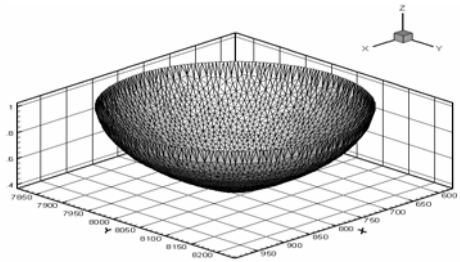
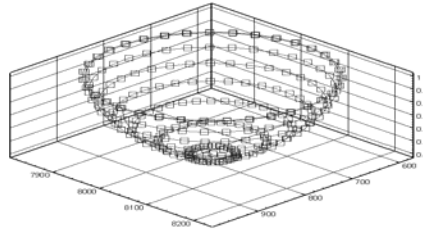
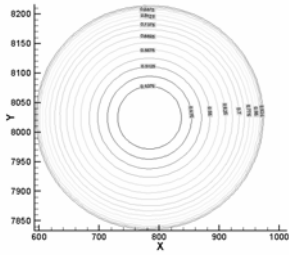
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1- Hadjithodorou, 1962

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

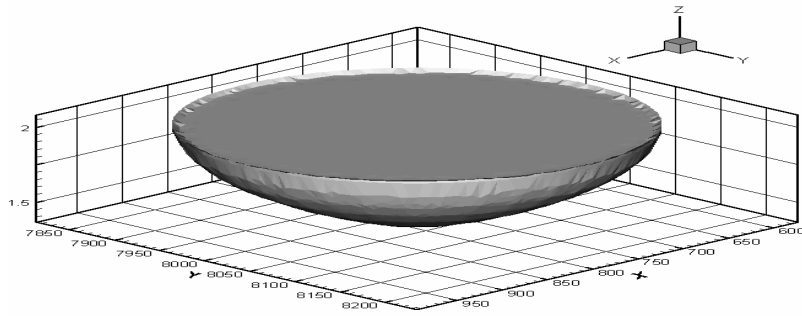


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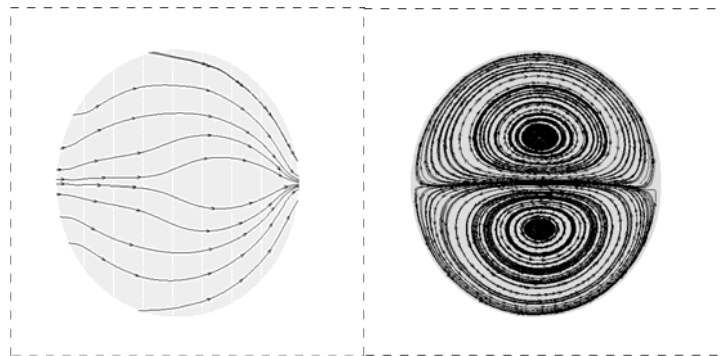


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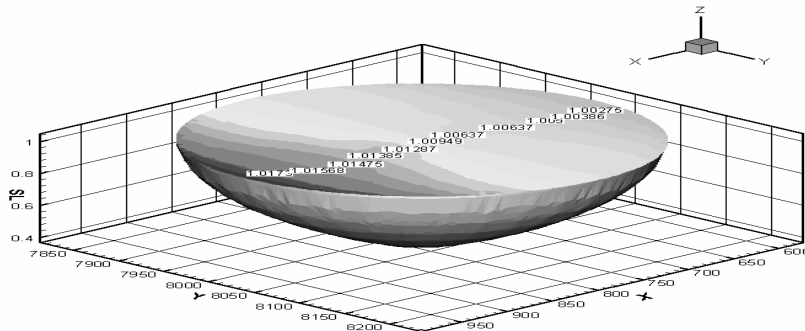


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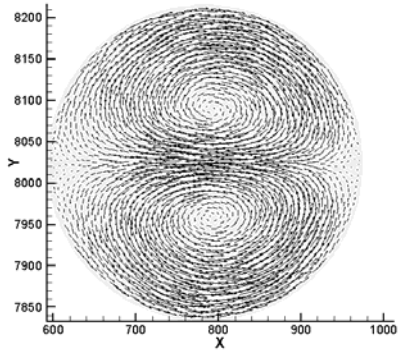


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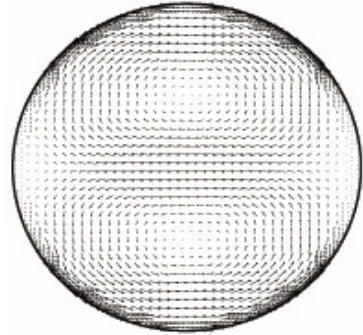
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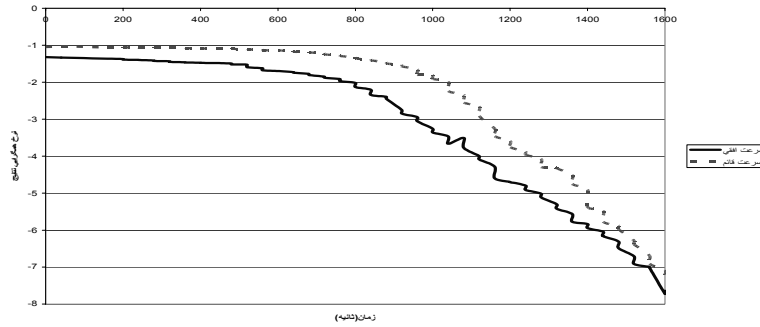


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Liggett and Hadjithodorou 1962



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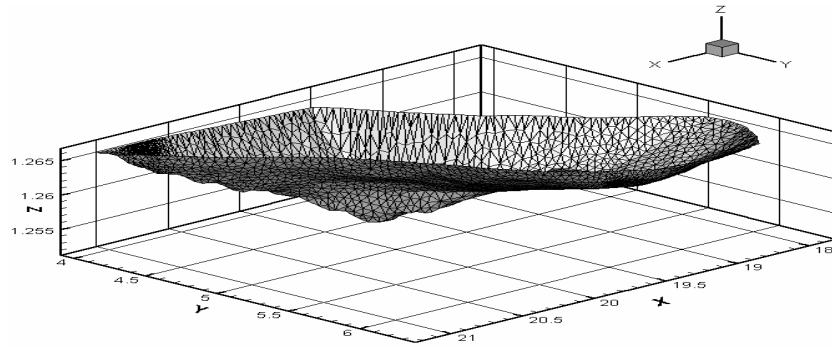


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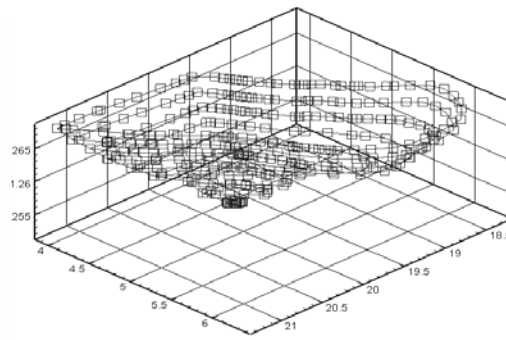
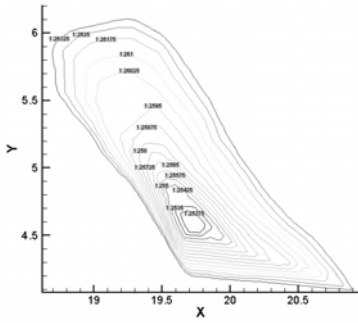
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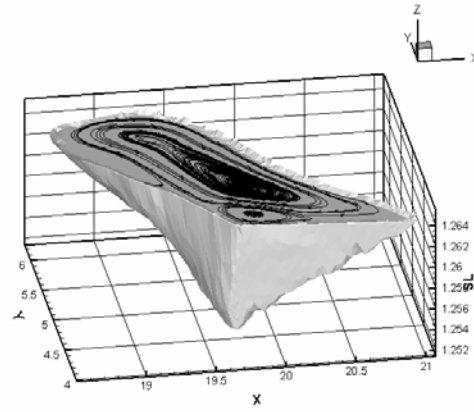
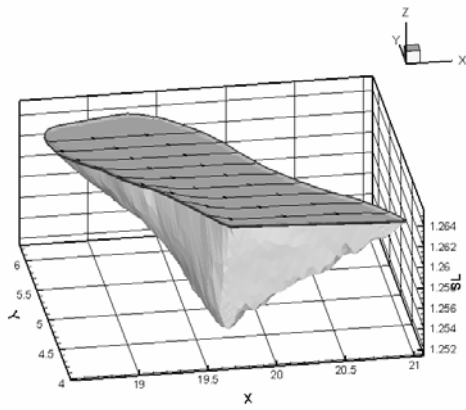
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