MATHEMATICAL MODELING OF UNCOMPRESSED LAMINAR SYMMETRICAL STRENGTH

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So far, there are many cases to sharp simplify Navier-Stoks equations and find private solutions very much. These studies usually or performed based on symmetrical reviews or based on the theory of dustries and sizes.

The mathematical model of the movement of unfailed fluid in this article was collected in this article. To do this, the movement and transversal speeds and pressure of water through the Navier-Stoks equations.[1]

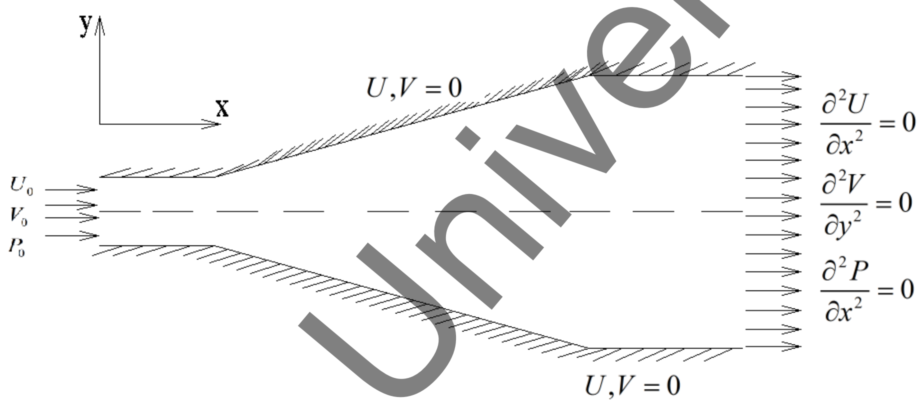

Figure 1 Diffuzion channel

Navier-Stoks equations:

$$\begin{cases} \dfrac{\partial U}{\partial x} + \dfrac{\partial V}{\partial y} = 0, \quad \dfrac{\partial P}{\partial t} + k\left(\dfrac{\partial U}{\partial x} + \dfrac{\partial V}{\partial y}\right) = 0 \\ \dfrac{\partial U}{\partial t} + U\dfrac{\partial U}{\partial x} + V\dfrac{\partial U}{\partial y} + \dfrac{1}{\rho}\dfrac{\partial P}{\partial x} = \nu\left(\dfrac{\partial^2 U}{\partial x^2} + \dfrac{\partial^2 U}{\partial y^2}\right), \\ \dfrac{\partial V}{\partial t} + U\dfrac{\partial V}{\partial x} + V\dfrac{\partial V}{\partial y} + \dfrac{1}{\rho}\dfrac{\partial P}{\partial y} = \nu\left(\dfrac{\partial^2 V}{\partial x^2} + \dfrac{\partial^2 V}{\partial y^2}\right). \end{cases} \qquad (1)$$

Here U, V - The dye and transverse velocity of the flow on the channel, P -hydrostatic pressure, ρ -density of flow $(\rho = const)$, ν -viscosity, t -time.

The Mac-Cormack method [2] was used to solve this (1) equation.

Predictor $\quad \Phi_{ij}^{n+1} = \Phi_{ij}^{n} - C\dfrac{\Delta t}{\Delta x}(\Phi_{i+1,j}^{n} - \Phi_{ij}^{n})$

Corrector $\quad \Phi_{ij}^{n+1} = \dfrac{1}{2}[\Phi_{ij}^{n} + \Phi_{ij}^{n+1} - C\dfrac{\Delta t}{\Delta x}(\Phi_{ij}^{n+1} - \Phi_{i-1,j}^{n+1}) \qquad (2)$

Primary and border conditions

In the entrance $\dfrac{U}{U_0} = 1, \; V = 0, \; P = 0.$

From the condition of the wall on the wall $U = 0, \; V = 0, \; P = 0.$

Extropolation [3] was used for all speeds in the exit. $\frac{\partial^2 U}{\partial x^2} = 0, \frac{\partial^2 V}{\partial y^2} = 0, \frac{\partial^2 P}{\partial x^2} = 0.$

Analysis of the number of numbers

In Figure 2 below, there are transverse, longitudinal velocity speed and pressure graphs of the stream.

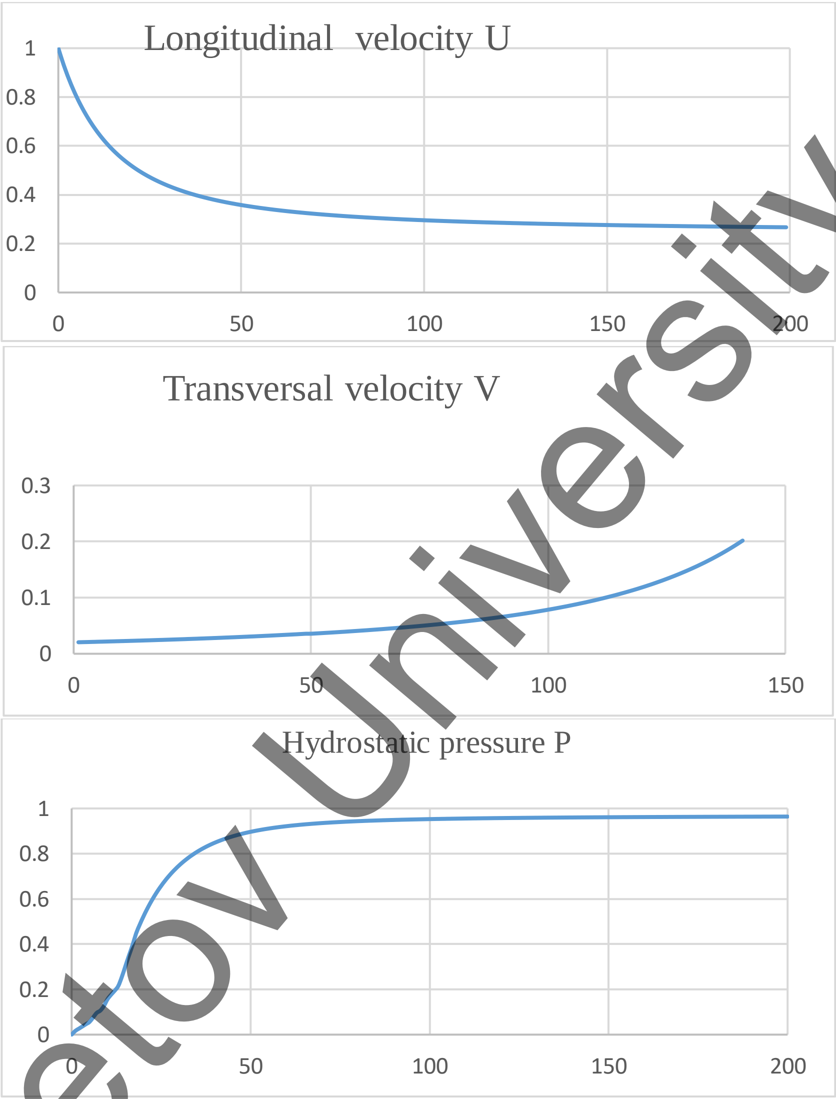

Figure 2. Scholars based on the transverse, longitudinal velocity of the stream and the number of pressure obtained by the channel

Conclusion

This thesis was studied in an unpleasable liquid movement in the diffusion symmetric channel. The Mac-Cormack method used in the calculation of Navier-Stoks. The graphics were built using dyable, transverse speeds and pressure using the number.

References

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