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Mathematical modeling of free convective MHD flow of temperature and heap transfer effects on caisson fluid over an oscillatory vertical plate

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Abstract---In general, some static analysis of the predictable flow of the compressible and caisson fluid of some infinite vertical plates is determined by taking into account its varying mass or constant fluid flow and the uniform increase of the partition temperature. Differential equations can be predicted using different components of the Laplace transformation technique. Usually, two different solutions are available when the fluid flows in a particular direction. In this paper, an improved method for calculating the velocity of different fluids is proposed. Its possibilities are designed to calculate the different types of events that take place near the high temperature plates of the liquid. The results are compared with the flow along the plates at a near constant temperature.

Keywords---Predictable flow, caisson fluid, infinite vertical plates, constant fluid flow, partition temperature, Laplace transformation.

Introduction

The various properties in the engine used in modern times are described through more complex systems. The more improved scientific methods to explain more. If

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these scientific methods are not, the choices of various complex issues will become more complex systems. For an example, Newton has been designed to understand the comments on the basis of their runs on the basis of some of the fewest liquids released by Newton. Analysis of the practical applications are simple; their understanding and descriptions are simple because practical applications are enabled [1]. Thus, Newton's liquid theories seem very useful. And these are the norms between those specific liquids. It’s important principles include cut pressure and the principles of the cut strain rate. These are considered very important in the most widely spoken concepts. On the basis of various fluid-based factories running was the flow of liquid materials. For example, if oil products and receipt of the receipt of the receipt, the flow of goods used is very important.The Caisson liquid flow calculation process is commonly used to measure the flow of fluids [2]. The size of the fluid fluids and its various types of liquidity were able to handle it effectively. Furthermore, some studies have been carried out to calculate the flow of fluids, which is centered on the fundamental volumes. Furthermore, the study of radiations caused by the surface of the surface on the basis of some liquids and the inspection of the category of the tip surface [3].

A random difference for an organization is the problem in writing equation, and is associated with the structure of the system under the random word analysis [4]. One of the potential solutions for this problem is to get consistent and sturdy areas from the same equation. For these purposes, it is convenient to use the basic operating equation, which can be randomly assessed by the Foker Planc equation, in turn, in turn, the equivalent random difference in the form of Langes's equation [5]. One-step processes refer to continuous time margoves processes, which will take values in the range of integers, which allows the changes to the nearby sections [6]. We consider multi-dimensional one-step process,

$$x\ (a) = (1(a),\ 2\ (a),\ \ldots,\ n\ (a)) = (0.1),\ (0,1) \tag{1}$$

The changes, ie ie, The process x a() is the length of the time specified.
There are two approaches to describe the evolution of the systems with interactive components - this is the construction of the firm or random models. Unlike concrete models, random models make it possible to take into account the probability and impact of the process of the processes under the study. Outdoor environment makes it random fluctuations in sample parameters [7]. The material settings of the study may be described using a-step processes and switching to another level from a state is associated with the contact with the communication. An example of models describing the mechanism of the development of the development of the interactive population, such as "hunting-prey", coexistence, competition and their changes [8]. The goal is to study the influence of the random part of the balance of the equation of the equation that describes the SDEs for such organizations and the determination of the equation.Systems of equations that arise in the description of the interactive organs are in many of the similar equations that describes the dynamics of the chemistry reactions [9].

Related works

Ananda et al.[4] measured the flow of caisson fluid over the vertical plane. Usually, the pressure of the caisson fluid is high. Also known models are always with a caisson cut look. And the changes that occur when its cut-off point reaches level 0 are such that their current measurements are such that they have a high degree of viscosity so that no flow can take place there due to pressure. And when measuring this with the results or cut-off ratios there is less pressure on its cutting area. As this pressure continues in the caisson fluid the design of its molecules will look like a solid. and if its shear pressure continues to increase and begins to move [10]-[16]. It is this excess pressure that makes the movement flow.Jawad, R. et al.[12] listed the various applications of caisson fluid. It is seen as the most important fluid used in various fields of biology. Take, for example, honey, a variety of sauces, jelly candies, and everything in the human body that has stress in common. Based on this pressure his chemistry and various fields are seeing movement. This caisson fluid also works well in a lot of places like pharmaceuticals, various preparation methods, creating biological openings [17]-[19].Razon K. M et al.[20] doingexperiments were carried out on the mass of viscous chemicals and the effect of heat on them. They calculated that the caisson fluid had a higher absorbency, a higher heat transfer capacity, and a more variable viscosity.

Problem formation

The Earth's atmosphere heats up by creating pressure that allows liquid water to remain on the Earth's surface, absorbing ultraviolet sunlight, and retaining heat (greenhouse effect) by warming the surface and reducing the temperature peak between day and night). In terms of volume, dry air contains 78.09% nitrogen, 20.95% oxygen, 0.93% argon, 0.04% carbon dioxide and a small amount of other gases. At sea level an average of 1%, and 0.4% more water vapor is in the air than in the whole atmosphere. The composition of the air, temperature and atmospheric pressure vary with altitude, and the air suitable for use in photosynthesis by terrestrial plants and the respiration of terrestrial animals are found only in the Earth's tropics and in the artificial atmosphere.Suppose we calculate the flow of a conductive and viscous liquid given a current. Let's try to calculate its thermal flow.

$$q\frac{\partial x}{\partial t*} = \mu * W\left(1 + \frac{1}{E}\right)\frac{\partial^2 x}{\partial r^2} - BB_0{}^2 x - \frac{\mu * l}{g_1}x + qgW_H(H - H_\infty) + qgW_P(P - P_\infty) \qquad (2)$$

$$qP_p\frac{\partial H}{\partial t*} = g\ \frac{\partial^2 H}{\partial r^2} \qquad (3)$$

$$\frac{\partial c}{\partial t*} = D\ \frac{\partial^2 P}{\partial r^2} \qquad (4)$$

With initial boundary conditions,

$$V = 0,\quad H = H_\infty,\quad P = P_\infty,\ y>0,\ t<0 \qquad (5)$$

$$V = V\sin(wt) \text{ or } VA(t)\cos(wt) \qquad (6)$$

The thickness of the atmosphere around the Earth is said to be 500 to 1000 km from the ground. Of these, the temperature decreases with increasing altitude from 8 to 18 km above the ground.

$$H = \begin{cases} H_\infty + (H_w - H_\infty)\frac{t*}{t*_0}, & if\ 0 < t* < t*_0 \\ H_w, & if\ t* \geq t*_0 \end{cases} \quad (7)$$

$$P = P_\infty + (P_w - P_\infty); \quad \text{as t} \geq 0 \text{ and y} = 0 \quad (8)$$

It's externally, from 50 to 60 km below the ground in the lower part of the stratosphere, with increasing density and pressure of the atmosphere, but the composition is considered almost constant. Good. The gas that forms this part of the atmosphere is commonly called air. Air is a colorless and transparent gas. Now introduce the dimensionless quantities;

$$r = \frac{U}{vt*_0}r, \quad t* = \frac{U^2 t*}{vt*_0}, \quad x = \frac{\sqrt{t*_0}}{U}x, \quad z = \frac{H - H_\infty}{H_w - H_\infty},$$

$$P = \frac{P - P_\infty}{P_w - P_\infty}, \; w = \frac{wv}{U^2}, \quad Pr = \frac{\mu * P_p}{g}, \; \tau = \frac{\tau}{px^2},$$

$$M^2 = \frac{BB_0^2}{pU^2}t*_0, \; \frac{1}{g} = \frac{vl^2}{g_1U^2}, \quad Gr = \frac{vgW_{H\,(H_W - H_\infty)}}{U^3},$$

$$E = \frac{\mu *_B \sqrt{2x_c}}{P_E}, \; Sc = \frac{v}{D}, \quad Gm = \frac{vgW_{P\,(P_W - P_\infty)}}{U^3}$$

The presence of the atmosphere with such a composition is unique to Earth and the high oxygen and low carbon dioxide levels are due to the carbon dioxide adjustment action of plants and the accumulation of oxygen over many years. The absorption of carbon dioxide by sea. Probably the result. Air, in combination with the ozone layer above it, absorbs strong light and heat from the sun, protects the earth's surface, and adjusts to breathe carbon dioxide, reducing the fall of cosmic rays and cosmic dust.Assign the values and we get,

$$\frac{\partial x}{\partial t*} = \left(1 + \frac{1}{E}\right)\frac{\partial^2 x}{\partial r^2} - \left(M^2 + \frac{1}{g}\right)x + Grz + GmP \quad (9)$$

$$\frac{\partial z}{\partial t*} = \frac{1}{Pr}\frac{\partial^2 z}{\partial r^2} \quad (10)$$

$$\frac{\partial P}{\partial t*} = \frac{1}{Sc}\frac{\partial^2 P}{\partial r^2} \quad (11)$$

Generally, the horizontal flow of air on Earth is called wind, but the movement of planetary atmospheres other than Earth is also called wind. In addition, the flow of plasma out of the sun is similar to that of solar air. Note that upward and downward currents are called wind currents, which are usually different from the wind. Since wind is a vector quantity, it is usually represented by two quantities: the direction of the wind and the velocity of the wind. When we treat theoretically in the field of meteorology, we often divide it into east-west components and north-south components. The direction of the wind indicates the direction of the wind. With initial boundary conditions,

$$V = z = C = 0;\ y>0 \text{ and } t<0$$

$$V = \sin(wt) \text{ or } V(t)\cos(wt) \text{ where } z = \begin{cases} t*, & if\ \ 0 < t* < 1 \\ 1, & if\ t* \geq 1 \end{cases} \tag{12}$$

$$= tV(t) - (t-1)V(t-1),$$

Hence P = t at y = 0 where t ≥ 0; then

$$x \to 0, z \to 0, P \to 0\ at*\ r \to \infty \tag{13}$$

Problem Solution

A propeller type anemometer is commonly used that can simultaneously measure wind direction and wind speed. Mainly for experiments and research, a thin wire of platinum or nickel, a wind turbine anemometer that uses wind power, or a dines barometer is what some call aggregate.To measure air in the sky, a light balloon filled with hydrogen or helium is emitted and monitored by a transport or radar, or a measuring instrument mounted on a large balloon, or a sound wave emitted into the sky. Attempts to measure wind direction and velocity by measuring Doppler change

Find the velocity profiles for ramped wall temperature

Heat transfer is when energy moves from one body to another due to the temperature difference between the two. The heat transfer process stops when the temperature of the bodies in the contacts is equal or the contact between them is removed. The amount of energy transferred from one body to another over a period of time is called heat transfer. One body can give heat to another, or absorb it, but the heat always goes from the body to the lowest temperature with the highest temperature.

$$\boldsymbol{z}(\boldsymbol{r}, t*) = f_a(\boldsymbol{r}, t*) - f_a(\boldsymbol{r}, t*-1)H(t*-1) \tag{14}$$

$$\boldsymbol{z}(\boldsymbol{r}, t*-n) = f_a(\boldsymbol{r}, t*) - f_a(\boldsymbol{r}, t*-1)H(t*-1) - f_a(\boldsymbol{r}, t*-2)H(t*-2) \ldots\ldots - f_a(\boldsymbol{r}, t*-n)H(t*-n) \tag{15}$$

$$C(y,t) = f_a(\boldsymbol{r}, t*);\ \text{likewise, } C(y,t-1) = f_a(\boldsymbol{r}, t*-1); \tag{16}$$

When heat is transferred from one body to another, the rate at which heat is transferred is proportional to the temperature difference. This is known as Fourier's law of thermal conductivity, which leads to Newton's law of cooling.To obtain the velocity profiles $(u_{sin}\ and\ u_{cos})$

$$x_{sin}(\boldsymbol{r}, t*-n) = \frac{i}{2} f_a(\boldsymbol{r}, t*-n) - \frac{i}{2} f_b(\boldsymbol{r}, t*-n) + \sum_{n=1}^{\infty} g_a(\boldsymbol{r}, n) - g_a(\boldsymbol{r}, n-1)H(n-1) - g_a(\boldsymbol{r}, t*-n) - g_a(\boldsymbol{r}, t*-n)H(t*-n) \tag{17}$$

$$x_{cos}(\boldsymbol{r}, t*-n) = \frac{1}{2} f_a(\boldsymbol{r}, t*-n) - \frac{1}{2} f_b(\boldsymbol{r}, t*-n) + \sum_{n=a}^{\infty} g_a(\boldsymbol{r}, n) - g_a(\boldsymbol{r}, n-1)H(n-1) - g_a(\boldsymbol{r}, t*-n) - g_a(\boldsymbol{r}, t*-n)H(t*-n) \tag{18}$$

In equilibrium thermodynamic systems, the amount of total heat exchanged with environmental factors is such that the system moves from one equilibrium state to another. On the other hand, in heat transfer, where systems have not yet reached thermal equilibrium, interest is focused on the intermediate event. It should be noted that the amount of heat is transferred over a period of time, i.e. the speed of heat transfer.

Find the velocity profiles for constant temperature

Here we need to compare the results with the magnitude of the temperature rise on the plate and the other effects of the resulting action. For this we need to compare the data with Eq. (8).The Laplace transforms are used, here to find the constant temperature.

$$\boldsymbol{z}(\boldsymbol{r}, t*) = f_a(\boldsymbol{r}, t*) \tag{19}$$

$$\boldsymbol{P}(\boldsymbol{r}, t*) = f_b(\boldsymbol{r}, t*) \tag{20}$$

To obtain the velocity profiles $(u_{sin} \; and \; u_{cos})$

$$x_{sin}(\boldsymbol{r}, t*-n) = \frac{i}{2} f_a(\boldsymbol{r}, t*-n) - \frac{i}{2} f_b(\boldsymbol{r}, t*-n) + \sum_{n=a}^{\infty} g_a(\boldsymbol{r}, n-1) - g_a(\boldsymbol{r}, t*-n) \tag{21}$$

Thermal energy is propagated by collisions between atoms and molecules of matter, whether solid, liquid or gaseous.

$$x_{cos}(\boldsymbol{r}, t*-n) = \frac{1}{2} f_a(\boldsymbol{r}, t*-n) - \frac{1}{2} f_b(\boldsymbol{r}, t*-n) + \sum_{n=1}^{\infty} g_a(\boldsymbol{r}, n-1) - g_b(\boldsymbol{r}, t*-n) \tag{22}$$

Solids are better conductors of heat than gases and liquids. Metals contain free electrons that can pass through the metal.

Achieve the Nussle Number

Because free electrons have better mobility, they are more capable of transmitting kinetic energy through collisions, which is why metals have higher thermal conductivity. From a macroscopic point of view, thermal conductivity is measured as the amount of heat transferred per unit time or caloric current: Based on the above calculations the Nussle number can be written as the follows,

$$N_x = -\frac{\partial z}{\partial r} \; where \; t * he \; value \; of \; r = 0 \tag{23}$$

To obtain the Nussle number for ramped wall temperature, then configure the eq.(9)

$$N_x = -\frac{\partial \boldsymbol{z}}{\partial r} \boldsymbol{r} = 0 \tag{24}$$

$$N_x = -([h_a(t*) - h_a(t*-1)H(t*-1)] - [h_b(t*) - h_b(t*-2)H(t*-2)] - \cdots \ldots \ldots - [h_n(t*) - h_n(t*-n)H(t*-n)] \tag{25}$$

To obtain the Nussle number for constant temperature,

$$N_x = -[h_{11}(t*)] \tag{26}$$

Achieve the Sherwood Number

Based on the above calculations the Sherwood number can be written as the follows

$$Sh = -\frac{\partial \boldsymbol{P}}{\partial r} \; where \; t * he \; value \; of \; r = 0 \tag{27}$$

To obtain the Nussle number for ramped wall temperature, then configure the eq.(9)

$$Sh = -([h_a(t*) - h_a(t*-1)H\,(t*-1)] - [h_b(t*) - h_b(t*-2)H\,(t*-2)] - \cdots \ldots \ldots - [h_n(t*) - h_n(t*-n)H\,(t*-n)] \quad (28)$$

To obtain the Nussle number for constant temperature,

$$Sh = -[h_a(t*)] \quad (29)$$

Skin friction calculation

Frictional force is the force exerted when two layers of solids or layers of liquid slide over each other. There are several types of friction keys:

- The dry friction force prevents the relative motion of the two solid surfaces in contact. Dry friction force is further divided into moving friction force between moving surfaces and static friction force coming between urban surfaces.
- Liquid frictional force is the force exerted between layers that are in contact with each other, moving, and in a viscous fluid.
- Lubricated friction is the frictional force exerted on a fluid between two solid surfaces.
- Skin friction refers to the ability of a solid in a liquid to resist movement.
- Internal friction refers to the resistance force that occurs between the components of a solid when it undergoes a transformation.

The Skin friction can expressed as the following,

$$\tau^* = -\mu * \boldsymbol{W}\left(1+\frac{1}{\boldsymbol{E}}\right)\tau \quad where\ \tau = -\frac{\partial x}{\partial \boldsymbol{r}} \mid \boldsymbol{r} = 0 \quad (30)$$

When the contact surfaces move with each other, the friction force between the two surfaces exerts kinetic energy through heat. This trait can have major consequences. For example, rubbing two pieces of wood can cause a fire. The kinetic energy is converted into heat in places where there is friction force. For example, when a viscous liquid is stirred, the liquid may overheat.

Results and Discussion

The different finite number of various parameters to resolve the equations (6) and (8) with the help of the various boundary conditions mentioned the above.

Table 1
Variation of skin friction for air

t	E	Sa	Mr	Mk	M	g	Temperature	
							Ramp	Constant
0.0964	0.241	0.1446	0.482	0.964	0.482	0.241	-0.61308	-0.85637
0.0964	0.2651	0.1446	0.482	0.964	0.482	0.241	-0.58117	-0.82087
0.0964	0.2892	0.1687	0.482	0.964	0.482	0.241	-0.55519	-0.79152
0.0964	0.241	0.1928	0.482	0.964	0.482	0.241	-0.65554	-0.89886
0.0964	0.241	0.1446	0.6025	0.964	0.482	0.241	-0.70008	-0.94337
0.0964	0.241	0.1446	0.723	0.964	0.482	0.241	-0.66808	-0.97222

0.0964	0.241	0.1446	0.482	1.0845	0.482	0.241	-0.72305	-1.08802
0.0964	0.241	0.1446	0.482	1.205	0.482	0.241	-0.66222	-0.90551
0.0964	0.241	0.1446	0.482	0.964	0.6025	0.241	-0.71134	-0.95465
0.0964	0.241	0.1446	0.482	0.964	0.6025	0.241	-0.53827	-0.76279
0.0964	0.241	0.1446	0.964	0.964	0.482	0.2651	-0.45496	-0.65282
0.0964	0.241	0.1446	0.964	0.964	0.482	0.2892	-0.58818	-0.83198
0.1205	0.241	0.1446	0.964	0.964	0.482	0.241	-0.71184	-0.90348
0.1446	0.241	0.1446	0.964	0.964	0.482	0.241	-0.81022	-0.95576

In Table 1 discuss about the layer arrangement may existadditional efficient during giving liberty than the nest and pipehigh temperaturemodifier. Move forwardduring gasoline and welding techcontaincomplete plate categoryhigh temperaturemodifiers practical. In HVAC applications, hugehigh temperaturemodifiers in this category are called plate and frame;

Table 2
Variation of skin friction for water

t	E	Sa	Mr	Mk	M	g	Temperature	
							Ramp	Constant
0.0964	0.241	0.1446	0.482	0.964	0.482	0.241	-1.17783	-1.64522
0.0964	0.2651	0.1446	0.482	0.964	0.482	0.241	-1.11652	-1.57702
0.0964	0.2892	0.1687	0.482	0.964	0.482	0.241	-1.06661	-1.52063
0.0964	0.241	0.1928	0.482	0.964	0.482	0.241	-1.25941	-1.72685
0.0964	0.241	0.1446	0.6025	0.964	0.482	0.241	-1.34497	-1.81237
0.0964	0.241	0.1446	0.723	0.964	0.482	0.241	-1.28348	-1.86779
0.0964	0.241	0.1446	0.482	1.0845	0.482	0.241	-1.38909	-2.09026
0.0964	0.241	0.1446	0.482	1.205	0.482	0.241	-1.27223	-1.73963
0.0964	0.241	0.1446	0.482	0.964	0.6025	0.241	-1.36659	-1.83404
0.0964	0.241	0.1446	0.482	0.964	0.6025	0.241	-1.03411	-1.46544
0.0964	0.241	0.1446	0.964	0.964	0.482	0.2651	-0.87405	-1.25417
0.0964	0.241	0.1446	0.964	0.964	0.482	0.2892	-1.13	-1.59837
0.1205	0.241	0.1446	0.964	0.964	0.482	0.241	-1.36756	-1.73574
0.1446	0.241	0.1446	0.964	0.964	0.482	0.241	-1.55656	-1.83617

At what time second-hand in unbolt loops, the temperature modifiers are usually of the gasoline kind to permit for intermittent separation, onslaught and testing which is shown in Table 2. Present benumerousen duringly connection plate high temperature modifiers, such as submerged and emptiness welded plate types, and they be commonly referred to as coupled-loop submissions so as refrigeration.

Table 3
Variation of Nussle Number in air

t	Variation of Nussle Number	
	Ramp	Constant
0.0964	-0.1264023	-0.6321797
0.1205	-0.1413721	-0.5654043
0.1446	-0.1548281	-0.5161217

0.1687	-0.1672749	-0.4778562
0.1928	-0.1814878	-0.4198272
0.2169	-0.19509518	-0.36860189
0.241	-0.20870256	-0.31737658
0.2651	-0.22230994	-0.26615127
0.2892	-0.23591732	-0.21492596
0.3133	-0.2495247	-0.16370065

In the table 3, a Plate heat exchanger can vary depending on the kind of cover they use in addition to the design of their multi-plates. A quantity ofspecial-plates can be imprintedthrough a "chevron" or additional structure, while variousmightcontain mechanical paddles and / or furrows.

Table 4
Variation of Nussle Number in Water

t	Variation of Nussle Number	
	Ramp	Constant
0.0964	-0.2331153	-1.1658867
0.1205	-0.2607231	-1.0427373
0.1446	-0.2855391	-0.9518487
0.1687	-0.3084939	-0.8812782
0.1928	-0.3347058	-0.7742592
0.2169	-0.35980098	-0.67978779
0.241	-0.38489616	-0.58531638
0.2651	-0.40999134	-0.49084497
0.2892	-0.43508652	-0.39637356
0.3133	-0.4601817	-0.30190215

In this Table 4, the temperatureon or after the process (heat medium) is wornIt heats both volumes of different liquids used in different types of process and uses both ends with clarity, keeping its various evolutions.

Conclusion

The results obtained in this module are defined based on the magnitude of its magnitude and the modulus of its enhanced mass transfer parameters. In the same vein the parameters of the electrical and magnetic field of the Caisson fluid are generated in the form of a model of several of the enhanced points of the modules defined in the self-assessment of its temperature decrease. The Caisson liquid samples are in motion in the process of describing the basics of further classifying its superstructure, as the volume definitions of its electrical and magnetic parameters enhance the calculated positive results. The Sherwood number of this module has not reached any change so its pressure is very smooth and elegant. The levels of caisson fluid flow are therefore classified according to these mass transfer effects.

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