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Heat Transfer Analysis in a Cylinder Consists Of Composite Speres across the Flow

B.Laxman
Associate professor
Department of Mechanical Engineering,
Samskruthi College of Engineering &Technology,
Ghatkesar, Rangareddy District,Telangana.

Suresh Aadepu
Associate professor
Department of Mechanical Engineering,
Samskruthi College of Engineering &Technology,
Ghatkesar, Rangareddy District,Telangana.

INTRODCTION:

Coiled Tube (CT) Turbo drilling technology has been recently proposed for drilling deep hard rock's for mineral exploration applications, Mokaramianetal. (2012). Coiled Tube (CT) is a continuous length of ductile steel or carbon fiber tube that is stored and transported over a large reel. The CT Unit (CTU) consists of four basic elements:

1)Reel, for storage and transport of the CT, 2) Injector Head, to provide the surface drive force to run and retrieve the CT, 3) Control Cabin, from which the equipment operator monitors and controls the CT, and 4) Power Pack, to generate hydraulic and pneumatic power required to operate the CT unit. In mineral exploration, drilling small size holes as fast as possible and obtaining reliable samples to the surface yields several advantages over conventional drilling methods. Coiled tube (CT) allows fast drilling by eliminating the connection time and providing continuous circulation during drilling.

This enables quick access to the zone of interest to collect the cuttings or obtain core samples. Coiled tube itself cannot rotate and therefore a down hole motor is needed to provide mechanical power and rotation to the bit. There are many special design criteria to be considered for successful operation of down hole motors in CT drilling (Beaton and Seale. 2004; RIO 2004; IT 2007). One major concern is that it is often difficult to produce enough weight on bit (WOB) to maximize the rate of penetration (ROP) for optimized drilling. Since the ROP of a fixed cutter drill bit is a product of the depth of cut (DOC) and the rotation speed and because the DOC is primarily produced by the available WOB, in an environment where WOB is limited (as with CT drilling); high rotation speed is the key driver for ROP, Beaton and Seale (2004). Amongst available down hole motors, turbodrills (turbine motors) are the best choice to be used for small size CT drilling hard rocks, Mokaramianet al. (2012): this results in a smooth borehole with little irrational effects during drilling and produce a high quality hole. The turbine motor section has multistage of stators and rotors which converts the hydraulic power provided by the drilling fluid (pumped from surface) to mechanical power with diverting the fluid flow through the stator vanes to rotor vanes. The fluid will run through the turbo drill and the bit nozzles to cool the bit and remove the cuttings generated under the bit. It will finally carry the cuttings inside the annulus between CT and the hole to the surface.

1.Aim and Objective of Research paper:

A three-dimensional study of transient heat transfer in a cylinder which is consisting of composite spheres at its centre is carried out through the solution using a finite-volume method. In this geometrical configuration the coolant (molten salt) was flowing across composite spheres in a cylinder. And the composite spheres consist of different layers (graphite, steel, graphite). And the heat is generated by the inner sphere.

In this model the conduction and convection takes place between the layers and coolant. The analysis was carried out throughout the domain and plots the temperature, velocity and pressure drop contours.Thus in this project, "Heat Transfer Analysis In a Cylinder Consists of Composite Spheres Across The Flow" the present composite spheres (graphite, steel, graphite) has been studied along with its thermal analysis in CFD and an enhancement in its flow resistance is made to decrease the flow resistance occurred to the composite spheres due to this heat is generated between the flow and composite spheres as we are having inside the composite spheres it will absorb.

The heat generated due to the flow as the steel member absorbing more heat it will get burst if it goes on like that, so that brine solution is using to cool the steel member.

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2. Investigation of Heat Transfer:

The phenomenological method is mainly used for studying the heat transfer processes in power plants. It is based on applying the basic laws of physics and some additional hypotheses on the course of thermal gas-dynamic processes. As a result of the use of this method differential or integral heat conduction equations are obtained. In the simple cases, they are being solved analytically or numerically. In more complex cases, the method of similarity or dimensions is used to obtain similarity numbers, a relationship between which is established as a result of the experimental study of the process. The phenomenological method of investigating the heat transfer processes is based on the following principles.

The substance that takes part in heat transfer is considered as a continuous medium. Its molecular structure and also the microscopic mechanism of heat transfer are not viewed but are taken into consideration by introducing the quantities that are responsible for the physical properties of substances (heat conduction, viscosity, heat capacity, density, etc.).To construct a mathematical description of the heat transfer process the first law of thermodynamics, the conservation law of substance and the conservation law of momentum are used. Fourier's law and Fick's law are adopted to set up a closed system.

2.1.Material Types:

i)FLUENT Fluid Materials
ii)FLUENT Mixture Materials
iii)FLUENT Droplet Particle Materials Order Materials by allows you to order the materials in the Materials list alphabetically by Name or alphabetically by Chemical Formula.
iv)FLUENT Database.
Properties
v)Density
vi)Thermal Conductivity
vii)Viscosity.
viii)Moleculal weight

After completion of the iterations the lift, drag and moment graphs are obtained with respect to the iteration, as shown in below figures 5.15

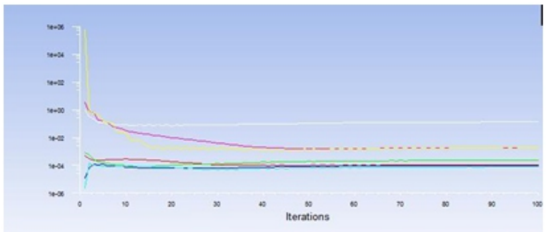

Figure 2.1Scaled residuals graph

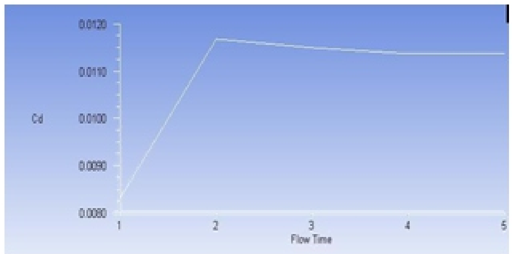

Figure 2.2 Drag plot

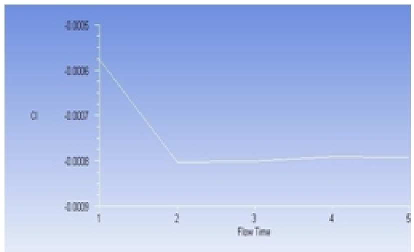

Figure 2.3 Lift plot

Figure 2.4 Represents that flow analysis has been completed

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Structural set up:

Outline of Schematic B2: Engineering Data

	A	B	C	D
1	Contents of Engineering Data		S.	Description
2	Material			
3	Structural Steel			Fatigue Data at zero mean stress comes from 1998 ASME BPV Code, Section 8, Div 2, Table 5-110.1
4	laminated mahogany			
*	Click here to add a new material			

Figure 2.5 Material added in engineering data.

Tabular Data

	Mode	Frequency [Hz]
1	1.	16.691
2	2.	78.583
3	3.	82.015
4	4.	151.49
5	5.	191.9
6	6.	338.07

Figure 2.6 shows the tabular data of thefrequencies

3.RESULTS AND DISCUSSIUON:

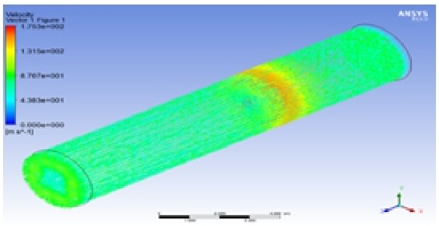

Figure3.1 Velocity vectors (showing flow direction), at velocity 44 m/s

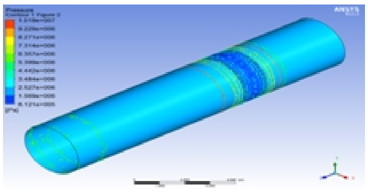

Figure 3.2 Pressure contours on the cylinder wall aroused at velocity 44 m/s

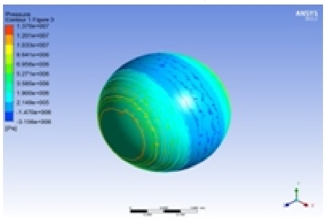

Figure3.3 Pressure contours on the composite sphere, for the velocity 44 m/s

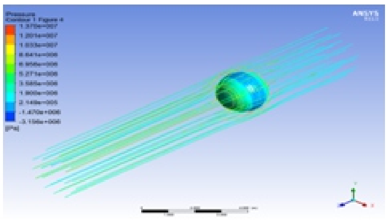

Figure 3.4 Stream line and pressure contours on the composite sphere, flowing across the cylinder.

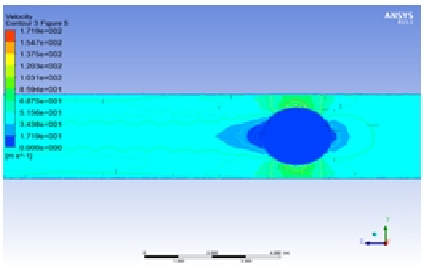

Figure3.5 Velocity contours of Cylinder-Sphere tube at velocity 44 m/s

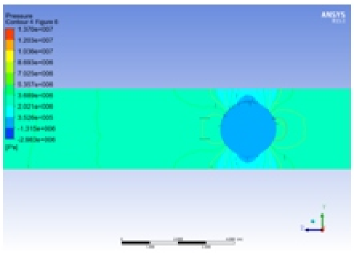

Figure 3.6 Pressure contours of Cylinder-Sphere tube at velocity 44 m/s

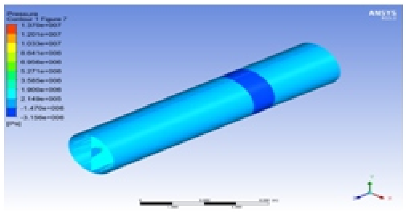

Figure 3.7 Pressure stream line and contours on the composite sphere, flowing across the cylinder

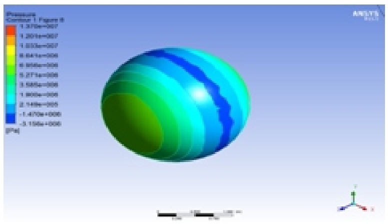

Figure 3.8 Pressure contours on the composite sphere, when the flow is flowing across the cylinder

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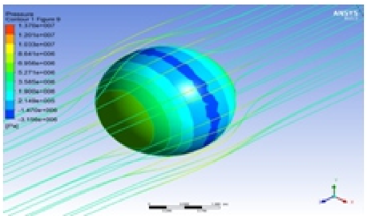

Figure 3.9 Stream line and pressure contours on the composite sphere, flowing across the cylinder .

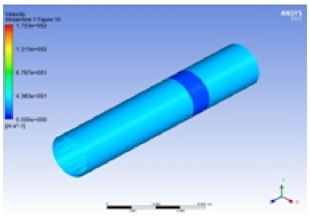

Figure 3.10 Pressure contours on the composite sphere, flowing across the cylinder wall velocity 22 m/s

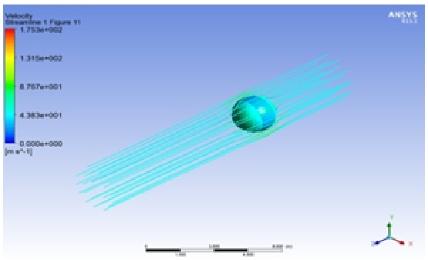

Figure 3.11 Stream line and pressure contours on the composite sphere, flowing across the cylinder at velocity 30 m/s

4.CONCLUSION:

Thus in this project, "Heat Transfer Analysis In a Cylinder Consists of Composite Spheres Across The Flow" the present composite spheres (graphite, steel, graphite) has been studied along with its thermal analysis in CFD and an enhancement in its flow resistance is made to decrease the flow resistance occurred to the composite spheres due to this heat is generated between the flow and composite spheres as we are having inside the composite spheres it will absorb. The heat generated due to the flow as the steel member absorbing more heat it will get burst if it goes on like that, so that brine solution is using to cool the steel member. About this project finally I observed the analysis of the flow is having certain pressure, velocity and temperature drop occurs in the composite spheres.

5.FUTURE SCOPE:

This survey, although extensive cannot include every paper; some selection is necessary.

Many papers reviewed herein relate to the science of heat transfer, including numerical, analytical and experimental works. Others relate to applications where heat transfer plays a major role not only in man-made devices, but in natural systems as well. The papers are grouped into categories and then into sub-fields within these categories. We restrict ourselves to papers published in reviewed archival journals.

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