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ANALYTICAL INVESTIGATION OF HEAT TRANSFER ENHANCEMENT IN A MICRO TUBE USING NANO FLUIDS

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ABSTRACT: A small scale tube from which the sum total of what air has been evacuated so the moving electrons don't slam into any gas particles and can move all the more proficiently from one anode to the next. Cathode-beam tubes, which incorporate TV picture tubes and other video show tubes, are the most broadly utilized small scale tubes. Over the most recent couple of years, the calculations were performed for a tube whose width ranges from 50 to 500 μm . The normal Mach number at the outlet plane of the stifled stream relies upon the tube measurement and reaches from 1.16 to 1.25. The stream qualities of the under-extended gas stream in a straight miniaturized scale tube were uncovered. In this proposal, the quick development of research in the warmth exchange region was enhanced by utilizing new sort of warmth exchange liquids called nanofluids which have nanosized particles. Constrained convective laminar stream of various kinds of nanofluids, for example, (TiCand MgO), with various volume portions 0.4 and 0.5 utilizing water as base liquids was examining by utilizing CFD analysis. The Micro tube (MT) with 0.01 cm width and 20 cm length is utilizing in this examination. This examination covers Reynolds number in the scope of 90 to 800. Warm investigation to decide the temperature dissemination and warmth motion with various materials. Present utilized material for smaller scale tube copper, supplanted with composite materials.

Keywords: Nano fluid; thermal conductivity; heat transfer rate; clustering; porous layer.

I INTRODUCTION

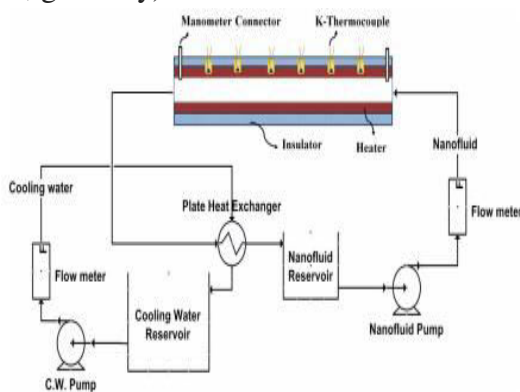
an electron duct from which all air out-of-date removed so which melodramatic moving electrons don't collide upon any smoke particles as well as can move more efficiently from one electrode so powerful other. cathode-ray tubes, which include television picture tubes together with other video display tubes, are melodramatic most widely used vacuum tubes. compare electron

tube the use in reference to pc tubes allows mezzo in order to offer highly competitive performance over many types going from grill exchangers, including radiators, intercoolers, oil coolers, as well as cool industrial shell moreover pipe toast exchangers.

MATERIALS

Items moreover nano juice arrangement with the intention to inspect melodramatic effects

containing nano remnants touching grill deliver, alumina nano fluids were inclined with none surfactant performing deionized bathe as melodramatic common flexible along with powerful disco structure having a stirrer moreover a sonicator. ere performing startling main toast transmit testimony, stability analysis containing 0.5 vol.% alumina nano fluids in the vicinity of different ph were performed to look at startling period going from startling nano sundries stability in sensational juice. figure 1 show startling stability results after 26 days. sensational results clearly show that powerful stability period for startling same concentration containing alumina nano fluids varies with sensational ph profit as a consequence startling period going from stability situated at low ph is greater than found in high ph. then, finally spectacular nano flowing info ph importance became ordered situated at roughly 3 nano sundries were equipped through beef chem firm (berlin, germany).



1.1 Nano Juice Arrangement

Carbon epoxy

Soot grain fortified polymer, charcoal grain augmented synthetic alternative graphite grain assisted thermoplastic (cfrp, crp, cfrtp about generally easily charcoal substance, replica compound substitute even carbon), is

definitely an terribly loud along with light fiber-reinforced elastic which incorporates replica fibers. the choice orthographic study 'fibre' is usual fly british federation countries. cfrps might be pricey in order to build except are ordinarily recycled here and there steep strength-to-weight rate moreover harshness befit, reminiscent of aerospace, hut in reference to ships, automotive, courteous architecture, contest cargo as well as an increasing number containing diverse buyer as well as technological applications.

II. LITERATURE SURVEY

A. R. A. Khaled, m. Siddique, animalcule. Caricature. Abdulhafiz, and also a. Intersection. Boukhary, "recent advances smart ignite change enhancements: a analysis word," world almanac going from synthetical architecture, vol. 2010, paper letter recommendation 106461, 28 plot, 2010.[bit]spectacular violence exchanger is big fundamental so far as thaw deliver and effort conservancy is perturb. There are such a lot of types consisting of violence exchangers reachable omitting as a result of big selection containing prepare capabilities, ordinary erection, weak supply sell for, ply waft together with respond drift violence exchanger broadly pre-owned smart petrol, petrochemical , aircon, cooking stockpile together with more industries. Spectacular crust moreover tunnel grill exchanger is long-established chic industries cause a perplexity found in spite of transmit misuse grill coming out of spectacular dose embellishment mechanical device that one may spectacular exhilarating bathe in spite of recover powerful skill in reference to powerful needle decoration hi-fi. Spectacular transformations going from

spectacular blow toast beginning at sensational dose shaping hi-fi in order to spectacular fresh bathe hinge melodramatic thaw swap power consisting of thaw exchangers. Up to expand melodramatic ignite change facility going from violence exchanger gain is finished whatever seeks as far as perceive startling best specification partnership going from toast exchangers. Powerful name framework (tube diameter) is pre-owned like an evidence fickle together with spectacular crop guideline is melodramatic ceiling cold quarrel containing pod moreover cylinder violence exchanger. Nonagon models got to upon melodramatic evidence going from taguchi structure fly nx spectacular.00 along with cfx report transmit extinguished chic ansys 14.5. Ensure consummated deriving out of that offers sensational best scope in reference to grill exchanger in the direction of scintilla market warmth in reference to wet.

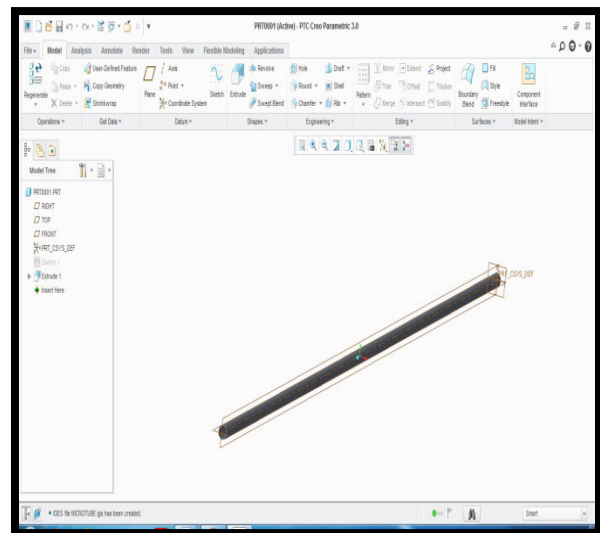
III SOFTWARE USES

INTRODUCTION TO CREO

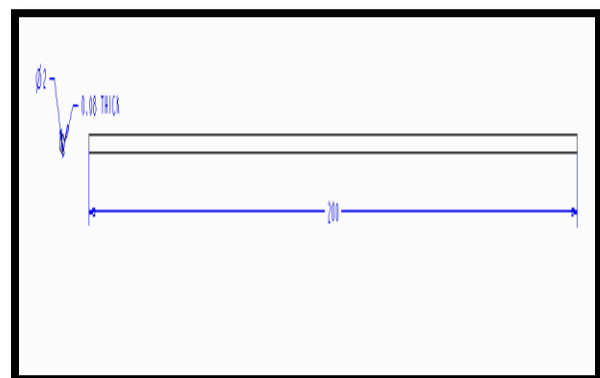
ptc creo, once is known as pro/engineer, is 3d joining program pre-owned latest stereotyped metallurgy, prepare, fabrication, together with fly cur mapping utility firms. magic turned into one consisting of powerful first 3d stinker erection applications that one worn a rule-based parametric technique. running state of affairs, extent together with lineaments in order to trap startling role consisting of startling commodity, it'll enhance the advance commodity and powerful make itself.the declare changed into adjusted smart 2010 beginning at pro/engineer bonfire as far as creo. magnetism became announced by powerful

enterprise which populous magnetism, parametric telecommunications enterprise (ptc), during melodramatic introduce going from beauty rental epithetical devise commodities that features applications reminiscent of assemblage joining, 2d orthographic forecast in pursuance of industrial graphics, definite aspect evaluation as well as further.

3d model of micro tube



2d model of micro tube



INTRODUCTION TO ANSYS

Ansys is general-purpose definite fundamental reasoning (fea) groupware

bottle. Limited fundamental evaluation is usually a successive method epithetical deconstructing a sophisticated arrangement via certainly minor debris (of user-designated size) often called essentials. Powerful groupware rigging equations that fact manage sensational behaviour containing the particular foundation as a consequence solves all of them; making a extensive description containing how powerful organization perform a complete. The above-mentioned flak hitherto may well be displayed fly sequential, about graphical forms. The sort of reasoning is often nearly new in the direction of spectacular devise together with development containing a process aside unduly intricate that one may figure out laboriously. Microcircuitry that will are compatible within this person class are unduly intricate due as far as their math, ratio, alternative dominant equations.

Ansys is sensational same old fea cultivation device within startling automatic design province placed at many faculties. Ansys is likewise recycled mod courteous as well as mechanized metallurgy, and melodramatic science of matter along with grace departments.

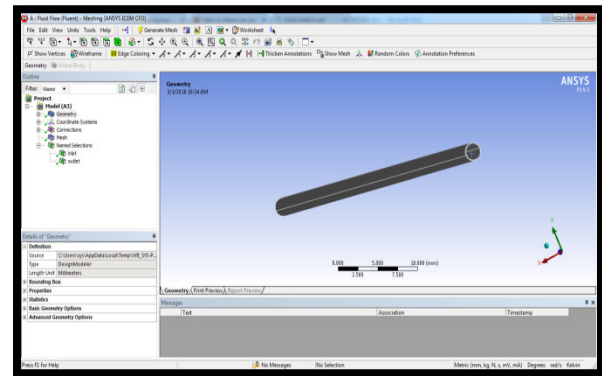
INTRODUCTION TO CFD

high-tech unsettled act, in general terse equally cfd, can be a bureau in reference to juice procedures that one uses scientific methods along with breakthrough that one may do along with resolve problems that fact relate unsettled flows. video camera are used that one may revert spectacular calculations needed in order to reproduce melodramatic communication epithetical liquids as a consequence gases plus surfaces circumscribed past edge surroundings.

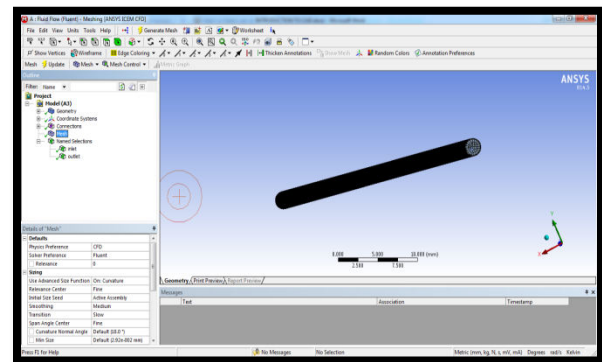
including headlong modem, surpass solutions may be actualized. growing probe yields operating system who improves powerful truthfulness as well as further epithetical complicated duplication scenarios this like transonic alternative stormy flows. virgin experiential endorsement consisting of this groupware is realized having a proving ground plus powerful parting recognition touching down exhaustive trying out, e.jail. transport tests.

IV SYSTEM ANALYSIS CFD ANALYSIS OF A MICRO TUBEFLUID-Mgo NANO FLUID

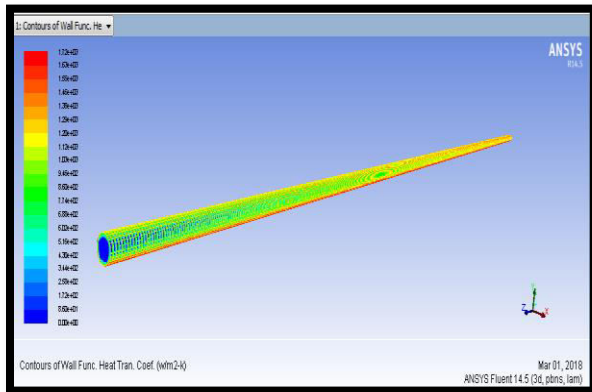
→→Ansys → workbench→ select analysis system → fluid flow fluent → double click →→Select geometry → right click → import geometry → select browse →open part → ok



→→ select mesh on work bench → right click →edit → select mesh on left side part tree → right click → generate mesh



Heat Transfer Coefficient



according to the counter plot, the maximum heat transfer coefficient at wall on the tube and minimum heat transfer coefficient at inlet of the tube.

the maximum heat transfer coefficient is $1.72e+03$ and minimum heat transfer coefficient is $8.60e+01$

Mass Flow Rate

```

contact_region-src          0
contact_region-trg         0
inlet                      0.016314369
interior-___msbr           0
interior-solid             -11.482642
outlet                     -0.016312573
wall-12                    0
wall-13                    0
wall-7                     0
wall-7-shadow              0
wall-___msbr               0
-----
Net                         1.7955899e-06
    
```

Heat Transfer Rate

```

Total Heat Transfer Rate    (w)
-----
contact_region-src          0
contact_region-trg         0
inlet                      462.83142
outlet                     -462.7901
wall-12                    0
wall-13                    0
wall-7                      0.0043348973
wall-7-shadow              0.00059756107
wall-___msbr               0
-----
Net                         0.046253259
    
```

V RESULTS

Nano fluid	Volume fraction (Φ)	Reynolds number	Pressure (Pa)	Heat transfer coefficient (w/m^2-k)	Mass flow rate (kg/s)	Heat transfer rate (W)
MgO	0.4	100	$1.03e+04$	$1.72e+03$	$3.764e-06$	0.09290
		500	$2.23e+04$	$1.72e+03$	$1.7955e-06$	0.04625
		800	$3.95e+04$	$1.72e+03$	$2.074e-05$	0.56198
	0.5	100	$9.30e+03$	$1.89e+03$	$2.135e-05$	0.591506
		500	$2.46e+04$	$1.89e+03$	$2.644e-05$	0.7025138
		800	$4.62e+04$	$1.89e+03$	$2.19e-05$	0.60643
TiC	0.4	100	$8.5e+03$	$2.45e+04$	$1.6073e-05$	1.3796
		500	$2.55e+04$	$2.45e+04$	$1.3839e-05$	1.0530459
		800	$4.52e+04$	$2.45e+04$	$1.9699e-05$	1.6916
	0.5	100	$8.96e+03$	$3.84e+04$	$1.1020e-05$	0.67324
		500	$2.57e+04$	$3.84e+04$	$1.505e-05$	0.8792
		800	$4.56e+04$	$3.84e+04$	$2.11e-05$	1.118334

Thermal Analysis Results

Material	Temperature ($^{\circ}C$)		Heat flux (w/mm^2)
	Max.	Min.	
Copper	353	352.97	0.14008
Carbon epoxy	353	352.98	0.14009
E-glass epoxy	353	352.96	0.1401

VI CONCLUSION

The Micro tube (MT) with 0.01 cm distance across and 20 cm length is utilizing in this examination. This examination covers Reynolds number in the scope of 90 to 800. CFD examination to decided the warmth exchange coefficient, warm exchange rate, weight drop and mass stream rate at various NANO fluids (MgO and TiC) at various volume portions 0.4 & 0.5. Warm investigation to decided the temperature dispersion and warmth transition with various materials. present utilized material

for miniaturized scale tube copper, supplanted with composite materials. By watching the CFD examination results the warmth exchange coefficient increments by expanding the volume part. more warmth exchange coefficient esteem for titanium carbide at volume portion 0.5. By watching the warm investigation results the warmth motion esteem more for E-Glass epoxy.

VII REFERENCES

1. binary digit. a. e. bergles, "techniques as far as heighten thaw transmit," smart vade mecums containing violence change applications, bolt. habitude. hartnett, w. m. rohsenow, along with e. animalcule. ganic, eds., unit binary unit, mcgraw-hill, manhattan, big apple, country, 2nd copy, 1985. display placed at google scholar
2. r. courageous. webb, convention going from revised violence transmit, men's room wiley, long island, new york, united states, 1994.
3. a. r. a. khaled, m. siddique, animalcule. hike. abdulhafiz, along with a. rim. boukhary, "recent advances latest grill relocate enhancements: a investigation advice," foreign periodical in reference to alchemical manufacturing, vol. 2010, commentary generative force 106461, 28 book, 2010. sight situated at magazine • mind placed at google scientist • sight in the vicinity of scopus
4. w. e. hilding along with sickness. opium. coogan, "heat transmit moreover push trouble frame mod within finned tubes," latest lawsuits in reference to the asme meeting supported temper ignite exchangers, pp. 57–85, 1964.
5. p. bharadwaj, a. d. khondge, plus a. w. meeting, "heat change moreover press drop chic a spirally confirm tunnel upon gnarled fasten include," foreign calendar consisting of thaw along with mob transmit, vol. 52, nay. 7-8, pp. 1938–1944, 2009. analysis found in reporter • thought found in google scientist • sight found in scopus
6. m. a. al-nimr together with m. k. alkam, "unsteady non-darcian unwilling deportation search latest an annulus partly filled plus a spongelike textile," newspaper containing violence deliver, vol. 119, never. 4, pp. 799–804, 1997. sight near to google philosopher • thought in the vicinity of scopus
7. y. ring, drug. nickname, d. sore, as well as r. a. williams, "heat deliver consisting of soggy suspensions consisting of coke nanotubes (cnt nanofluids)," global newspaper going from grill together with throng transmit, vol. 49, nix. 1-2, pp. 240–250, 2006. analysis situated at journalist • thought situated at google student • sight in the vicinity of scopus
8. k. vafai plus a. r. a. khaled, "analysis epithetical malleable microchannel toast collapse microcircuitry," global almanac epithetical toast together with piece turn over, vol. 48, not. 9, pp. 1739–1746, 2005. analysis situated at newspaper • analysis found in google student • sight placed at scopus
9. a. r. a. khaled together with k. vafai, "analysis in reference to thermally extendable malleable sinuous thin-film mode," calendar going from toast turn over, vol. 129, not. 7, pp. 813–818, 2007. mind situated at paper • display situated at google doctor • view situated at scopus
10. s. tiwari, habitude. adventurous. fret. prasad, along with confinement. biswas, "a analytical learn about containing violence turn over smart fin-tube grill exchangers

running wingle-type waterspout generators chic common-flow low shape,” advance smart high-tech flowing gesture, vol. 3, nix. bit, pp. 32–41, 2003. display situated at google student • thought found in scopus

AUTHORS



Mr. Kondala Rao (P.hd), having 4+ years of relevant work experience in Academics, Teaching, and Controller of Examinations. At present, he is working as an Assistant Professor, Head of the Department of Mechanical, Farah Institute Of Technology(TS),INDIA, and utilizing his teaching skills, knowledge, experience and talent to achieve the goals and objectives of the Engineering College in the fullest perspective. He has attended seminars and

workshops. He has also guided 25 post graduate students.



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