



An Detailed Study on Nano Fluids and Its Applications in Energy Sector

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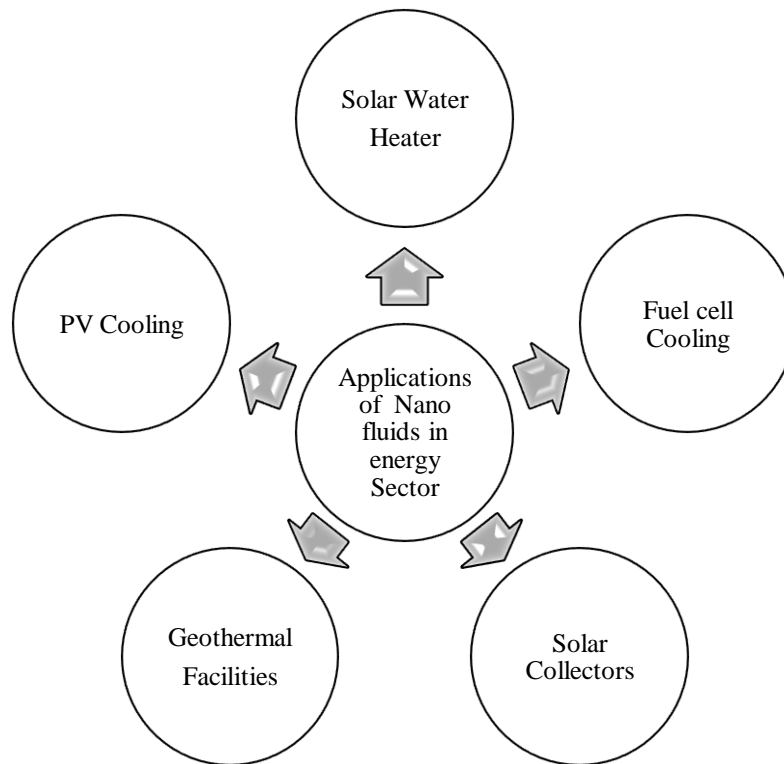
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Abstract. Nano liquids are primarily used as coolants for their advanced heat properties in heat exchangers such as Electronic cooling systems (Like flat plates) and radiators. Heat transfer on a flat plate has been analyzed by several researchers. The nanofluid is prepared by suspending small nanoparticles in basic Water and ethylene glycol Such as fluids with or without stabilization techniques. The average size of nanoparticles is less than 100 nm, and The nanoparticles used in nano liquids are usually. The base fluid is a Well stimulant treatment fluid used in cosmetics Continuous phase fluid. Continuous phase fluid may be added, But it is not defined as water, and whether it is liquid or hydrocarbon May be without hydrocarbon gas. Well-induced therapy More than one base fluid can be used. The atomic number can Derived from the dimensional analysis of the Fourier law, because it is equal to the dimensionless temperature gradient at the surface: q Heat transfer rate, k is the constant heat. Conductivity and T is the temperature of the liquid. Sodium benzoic sulfate (SDBS) Water is used as a surfactant in the preparation of nano liquids. Cu nanoparticles with demonized water Nano-liquid samples of three-volume fractions are prepared; the average diameter of the nanoparticles is 25 nm. Many researchers have called the validity stability of nanofluids. The scattering behavior of various non-substances in the solvent varies and depends on many factors. A complete understanding of particle-particle-particle interaction to create a stable fluid. Electronics heat management and increasing the efficiency of fluids for transfer from air to liquid cooling systems. Improving the energy efficiency of electronic systems. Improving rack density for computer systems by reducing computers to sub-1U operating systems. Improvement in Power Module Life (MTPF). A nanofluid is a liquid containing particles the size of nanometers. The Nano liquids are obtained by scattering. Non-aqueous fluid (NAF) is a water-based permeable fluid. Commonly used NAF systems are reverse emulsions based on diesel oil, mineral oil or synthetic fluid. In NAF systems, the water level is emulsified in a continuous oil phase, also known as water-in-oil emulsion or reverse emulsion. Nusselt A is the number Is the dimensionless number closest to the pocket number. Both numbers are held inside the fluid Will be converted to a liquid with thermal energy Used to describe the ratio of thermal energy.

Keywords: Al-based nano particles, Ionic fluids, Hybrid Nano Fluid, Micro polar fluid.

1. Introduction

The k factor Thermal conductivity is called constant. The thermal conductivity constant is k Great for materials that convert heat well Such as metal and stone), and Small for materials that convert heat badly (such as air). Nanotechnology is already being used to make many new types of batteries that will charge faster, have higher capacity, lighter weight, and higher energy density and longer charge life. Effects of nanoparticles inhaled into the body include pneumonia and heart problems. Studies in humans have shown that inhaling diesel heat causes general inflammation and alters the system that regulates spontaneous functions. In the cardiovascular system such as controlling the heart rate. The safety issues with nanoparticles are not well known, but their potential is clear. Their high surface and Due to the volume ratio, Particles are highly reactive or Reacts. In addition, they can travel through cell membranes in living organisms and interact with biological systems. Guaranteed air conditioners Making nano fluids Three properties increased thermal conductivity, Increased heat transfer and Is the increased central heat flux. Thermal conductivity of relatively small nanoparticles at base fluids Studies show that it greatly increases. Nano fluids are suitable coolant due to its high heat dissipation and can be used in any system that requires rapid response to heat changes such as automotive engines. The presence of nanoparticles in nano liquids Compared to pure liquid Contributes to better composition and higher thermal conductivity. Nanotechnology applications in the food industry can be used to detect bacteria in packaging or to enhance security by enhancing strong flavors and color quality and barrier properties. Nanotechnology has the great promise of delivering benefits not only on food but also around food. Nano-liquids, a type of new engineering materials containing Nanometer scale compounds and Basic liquids have their superior thermal properties and Have attracted the attention of researchers for a number of reasons. Numerous studies of nanofluids have been reported, particularly Some interesting improvements, New test results and Theoretical study nanofluid, including uniform and inconsistent the opposite results have been reported and are presented in the literature Nano-liquid nanoparticles and carbon nanotubes that scatter solid nanoparticles such as metal and metal have been extensively studied by many researchers[1]. Recently, a new type of nanofluidic nanoparticles has been reported to be dispersed. These types of nanomolting fluids have a long shelf life and can be easily mass produced. Although the ability of nanoparticles to increase the thermal conductivity of nanofluids is questionable, nanoemulsion fluids may form Open a direction for hot liquid probes. [7]



Increasing the effective thermal conductivity of nanofluids is the size of nanoparticles. However, assuming the nanoparticles were suspended, the volume fraction increased is not valid for the base fluid. New thermal phenomena of nanofluids are found only at low fractions. Thermal phenomena of recently discovered Nano fluids have been reported experimentally in many studies. For example, nanofluids have very low partial and irregularly high thermal conductivity with strong thermal and measurable conductivity [11]. The thermal behavior of nanofluids was first proposed as a large nanoscale mechanism by nanosynthesis induced by Brownian motion, but this is not clearly explained and is not the result of other new concepts used in the model and various parameters on thermal conductivity. Nano fluids. The effects are considered introduction of LHP silica nanofluids, which alter the moisture and interface tension in the oil recovery, have been explored by laboratory Coroflot displacement testing in low- to medium- and high-penetration core cores and projected on figs [12]. Oil recovery after saline infiltration is in the range of 36–62% for low-medium penetration of OOIP and the trend is to increase oil recovery with increased rock penetration. Meanwhile, highly permeable core plugs recover 50-64% of OOIP after flooding in salt water. Nano fluids 0.2 cm³ / min Were injected at a fixed injection rate to 3 PV and required about 0.5-1 PV for displacement. Other oils. Has the ability to displace due to nano fluids [15].

2. Al-Based Nano Particles

Micro oxides and Production of nanoparticles, i.e., plasma-chemical and electrolysis. Plasma-chemically synthesized powders are synthesized by thermo chemical decomposition. Liquid-clear Agents in high temperature heat transfer [52]. Shows the fabrication process of the hybrid prototype. SiC whiskers and SiC nanoparticles with ultrasonic mixing for 0.5 h dissolved in mixed whole alcohol. compounds containing special mold on a prototype. After the performance is completely dry on a roster, the prototype is laid on a metal axis of the composite. The SEM photo of the hybrid shows the prototype. SiC whiskers can be seen to be uniformly distributed and approximately Orient in prototype. Detected due to low magnification which is not possible with microscopic SiC particles [53]. Can't find any blanks inside Microstructure refer to the high density Of the mixture. Mixture. Holes created by SiC clusters were also detected when the matrix successfully penetrated [54]. ti-based metal glass Reinforced with nanoparticles A novel al-based composition, With hot discharge Formed by powder metal by mechanical mixing. During the ball grinding process, MG particles by severe plastic decomposition Were refined into nanoparticles. The hot emission of powder nanoparticles in the Al-7075 matrix caused The density of the glass and Uniform scattering. This unique Homogeneous structure without adversely affecting plasticity Provides significant expansion of strength, Thus super-high specific Yield builds strength. [55]. Volume fractional particle size And the particle size can affect the shear forces Considered two significant factors. It was found that due to the Strengthening effect of SiC nanoparticles, Range and profile of the shear forces vary depending on the size of the reinforcing particles. In the final stage of the sintering process the NiO particles get trapped in the superconducting matrix and lead to the formation of nanoparticles. These defects significantly improve the flux knitting And at temperatures approaching T_c Act as centers with high knitting energy There may be a possible way [56].

3. Ionic Fluids

In 2009, Ribeiro et al. developed to deal with the term ionic liquids, the Challenges Facing Conventional Heat Transfer Liquid ionic liquids are a unique fluid with significant thermo physical properties, which helps to increase the Ionic liquids emit 100°C melting salts and emit adjustable positive and negative ions and exhibit very low vapor pressure and chemical and thermal properties. [57]. past decade. However, there are several difficulties in producing a stable nano fluid and can be integrated into practical applications to increase heat dissipation. anything heating system. [58] Despite nanofluids and some reviews of Attempts have been made to analyze the latest research on nano-liquid auxiliary heat exchangers, nano-liquids and ionic liquids, which have led to important discussions on how to improve the thermal performance of a system. The product, thermo physical and hydrothermal properties, algorithms, factors that contribute to obtaining stable and improved thermo physical properties and its advantages are integrated with heat transfer applications. Getting ready for the most challenging future direction large quantities of nano-liquids and ionic liquids at low cost [59]. Their production fluids are not measured for cost of production processes will definitely be higher as nanoparticles and ionic liquids are produced more and are activated. The thermal conductivity and thermal efficiency and temperature of ionic liquids are measured by the activity of nanofluids with MWCNTs. The obtained thermal conductivity data are uncertain and, where available, agree with the previously announced data [33]. The data capacity for heat also matches well with the published data and is estimated to be 1% uncertain. Ionic fluids Refers to the new and innovative heat transfer fluid with attractive thermo physical properties. They are moldable and can adjust well with their base ionic fluids. According to the test results of the temperature and concentration process, the effective wall thermal conductivity and specific heat capacity of the multi-wall carbon specifications ionic fluids in many ionic fluids. The results show that ionic liquids exhibit better thermal conductivity and specific heat. They are more efficient and more concentrated compared to their base ionic liquids Carbon nanotubes [19].

4. Hybrid Nano Fluid

In this analysis of the test method, By tube heat exchanger Of hybrid nanofluid flow Heat transfer behavior, Forced convection, thermal conductivity and The thermal properties of the heat transfer coefficient were also examined. By separating the nano composite of the copper-titanium hybrid Made of nano fluid. There were trials conducted on the volume concentrations of various nanoparticles added from 0.1% to 1.0% in the base liquid range. [50]. Convection heat transfer coefficient The results show a maximum of 48.4% to 0.7%. Very few works have been presented from the literature on compounds such as hybrid nanofluidic Cu-TiO₂ suspended in cold liquid. Madhesh et al. The heat transfer and flow properties of silver ethylene glycol nanofluids were tested. The results show that the concentration of nanoparticles in the base fluid regulates the average free path of the moving particles, and can effectively promote heat transfer between the inner liquid layers [24]. Numerically studied the impact of the Magnetic field strength, number of dipoles and their arrangement in the entropy generation of Mn -Zn hybrid nanofluid flowing between parallel plates. Total entropy formation decreases as Renault's magnetic field strength, number and number of dipoles increase. [20]. Furthermore, they concluded that its location per bipolar Studies related to the entropy formation of nanofluids and hybrid nanofluids in micro channels, mini channels and cavities have been reviewed for different boundary conditions, and there are significant changes in entropy formation variation when using two and three dipoles. which does not affect global total entropy generation. Ratio [28]. And physical conditions. According to In the reviewed literature, the implementation of hybrid nanofluidic nanofluids in micro channels, mini channels and cavities would be an important alternative to traditional heating systems. are solved. The nanoparticles in a hybrid nanofluid can increase the hydrodynamic diameter of the nanoparticles, thus decreasing the viscosity and increasing the pressure. However, when evaluating the effects of nano fluids on plate heat exchangers, a comparative power and heat transfer coefficient based on the pump is required [36].

5. Micro Polar Fluid

The hybrid nano fluid is regulated. A new type of nano fluid is characterized by its thermal properties and potential applications. It is used to increase the heat transfer rate. The main purpose of the present analysis is to present a comparison between the behavior of conventional nanofluid and the emerging hybrid nanofluid in the presence of a Micropolar fluid theory. at the rapidly elongated surface rotation and pore media [51]. The hybrid nanofluid is controlled in rapid elongated surface rotation and porous media. [60]. Exotic lubricating oils, pulp solutions, sludge liquids, Creature an assortment of uses in the drug, substance, food handling and designing enterprises. Microbial science is examined exhaustively in his books. The stream conduct of three-layered Micropolar liquid was examined by [61]. Then, at that point, the way of behaving of the Micropolar liquid was quickly analyzed. Colorful ointments, mash arrangements, slop liquids, creature designing ventures. Microbiology is discussed in detail in the books of Lukashovich and Eringen [62]. Using the boundary layer theory with the condition that the vortex should disappear at the solid boundary, the flow of the micropolar fluid was conducted considering the plane and axial asymmetric flows by the bed and magnet. He then applied the micropolar model to the turbulent cutting flow and applied the boundary position. rotational viscosity would disappear, i.e. the rotational speed should be equal to the inclination. The heat transfer probe surface is subjected to alternating heat flow when immersed in an uncontrolled

Newtonian fluid. This is because, in the present study, the work of the elbow muscle had to be extended to the micro polar fluids, which shows the effects. Local circulatory pressure and pair pressures. The theory of micro polar fluids, Classical Newton's theory of fluids explains adequate flow behavior [63].

6. Conclusion

Nano-liquids, a type of the new designing material with nanometer-sized mixtures and base liquids, has drawn the consideration of analysts for its prevalent warm properties and numerous abilities. Various examinations specifically have detailed a few intriguing upgrades, new experimental outcomes and hypothetical investigation of liquids. Shows the fanciful course of the cross breed model. Stubbles and were scattered in complete liquor blended in with an ultrasonic combination for 0.5 h. Intensifies exceptional pivot in a model. On the off chance that the performance of a roster is completely dry and the alloy is molded on a metal axis, recent researchers are focusing on changing the Studies on improving heat transfer using nano-liquids, ionic liquids and nano-liquid assist Devices have received significant attention around the world over the past decade. Furthermore, they concluded that bipolar is its location, Studies on the entropy formation of nano fluids and hybrid nano fluids in microchannels. Mini channels and cavities were reviewed at different boundary levels, with significant changes in entropy generation variability when using two and three dipoles, which did not affect the global gross entropy production rate. . . The behavior of the micropolar fluid was rapidly examined.

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