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# RECENT ADVANCEMENTS IN NANOFLUID FLOW THROUGH STRETCHABLE SURFACE

**G. K. Mahato and G. P. Gifty**
Department of Mathematics, Centurion University of Technology and Management, Odisha, India

**ABSTRACT**

*Nano-fluids attract us due to the extraordinary enhancement in their thermal conductivity. Scientists and researchers, during the last few years, confined their studies on measuring and modeling the effective thermal conductivity of nano-fluids. There are many theoretical as well as experimental studies on nano-fluid flow with heat transfer through stretchable surfacesavailable in open literatures. Objective of the present review study is to summarize the important published articles on nano-fluid flow through stretchable surfaces.*

*Keywords: Nano-fluids, thermal conductivity, heat transfer, stretchable surface.*

## 1. NANO-FLUIDS AND THEIR APPLICATIONS

Nano-fluids are fluids with nano-sized (typically small) particles suspended in some base fluid. These particles are known as nano-particles. Some common base-fluids are water, oil, ethylene glycol etc and some common nano-particles (which are being used usually) metals, oxides, carbides, or carbon nanotubes. Present days, carbon nanotubesattracted the attention of the researchers as well as industries to produce nano-particles using carbon nanotubes as the raw materials.Nano-fluids are known for their improved thermal conductivity, basically.

Present days, nano-fluids are being popularly used due to their enhanced thermal conductivity. Some of the industrial applicationsincludecooling of electronic devices, Nuclear reactor cooling, metallic baths in metallurgy, engine cooling, heat exchanger, pharmaceutical processes, heat transfer processes etc.

## 2. LITERATURE SURVEY

In the last two decades, there has been seen a great influence towards the increment in the thermal conductivity of a general fluid due to the requirement of high rate of heat transfer in many industrial as well as domestic applications.To overcome the problems of low conductivity, researchers are forced to develop fluids with enhanced thermal conductivities. Coming forward in this direction,Choi and Eastman [1] initiated research and coined the term “nano-fluid” to refer fluids with suspended nanoparticles. These fluids have peculiar and improved thermo-physical properties. Choi et al. [2] encountered that thermal conductivity of the base fluids (conventional fluids) could be enhanced (around 40% to 150%) significantly by mixing a small amount (<1% volume fraction) of nanometre-sized-particles in the base fluid. To have an exposureon understanding about the latest advancements in the field of nano-fluid flow, a brief literature review has been done considering the investigations during the present decade. Some important research works have been mentioned below:

Hardy et al. [3] studied the “radiation effect on viscous flow of a nanofluid and heat transfer over a non-linearly stretching sheet”. In their investigation, they found that the velocity profile decreased with the effect of volume fraction and non-linear sheet parameter. The temperature profile increases with the volume fraction dissipation effect while the nonlinear sheet parameter and thermal radiation parameter effect decreases $TiO_2$ has the highest cooling effect compared to . $Al_2O_3$and $Cu$.

Zheng et al. [4] studied the “Flow and radiation heat transfer of a nanofluid over a stretching sheet with velocity slip and temperature jump in porous medium". In their investigation, they observed that the velocity of heat transfer increases with an increase in the effect of the slip parameter. The temperature profile increases with the increase of the velocity slip parameter, the thermal radiation parameter, the temperature ratio parameter, the Brownian motion parameter and thermophoresis parameter. The temperature profile decreases with an increase of the Lewis number parameter, the temperature jump parameter and the pradntl number parameter. The volume fraction concentration profile increases by increasing the effect of the velocity slip parameter and decreases with the effect of the temperature jump