

## Accepted Manuscript

Title: Effect of magnetic field on Blasius and Sakiadis flow of nanofluids past an inclined plate

Author: S.P. Anjali Devi P. Suriyakumar

PII: S1658-3655(17)30036-5

DOI: <http://dx.doi.org/doi:10.1016/j.jtusci.2017.03.004>

Reference: JTUSCI 373

To appear in:

Received date: 18-1-2016

Revised date: 13-7-2016

Accepted date: 20-3-2017

Please cite this article as: S.P. Anjali Devi, P. Suriyakumar, Effect of magnetic field on Blasius and Sakiadis flow of nanofluids past an inclined plate, *Journal of Taibah University for Science* (2017), <http://dx.doi.org/10.1016/j.jtusci.2017.03.004>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



# Effect of magnetic field on Blasius and Sakiadis flow of nanofluids past an inclined plate

S.P.ANJALI DEVI<sup>1</sup> and P.SURIYAKUMAR<sup>2</sup>

<sup>1,2</sup>Department of Applied Mathematics, Bharathiar University,  
Coimbatore-641 046, TamilNadu, India.

Email :<sup>1</sup>anjali Devi\_s\_p@yahoo.co.in, <sup>2</sup>suriyakumar\_08@yahoo.co.in

**Abstract** : A theoretical study on the effect of magnetic field on the classical Blasius and Sakiadis flow of nanofluids over an inclined plate is presented in this paper. The governing partial differential equations are converted into ordinary differential equations using suitable similarity transformations. The transformed boundary layer equations are solved numerically using MATLAB(bvp4c). Two types of nanoparticles are chosen namely copper and alumina in the base fluid of water with the Prandtl number ( $Pr=6.2$ ). The effects of the governing physical parameters over the velocity, temperature, skin friction coefficient and reduced Nusselt number for both the Blasius and Sakiadis flows are displayed graphically. The characteristics of physical and engineering interest are discussed in detail.

**Key Words:** Nanofluid, Blasius flow, Sakiadis flow, MHD, inclined plate, mixed convection.

## Nomenclature

$f$	dimensionless stream function	$Re_x$	local Reynolds number
$g$	acceleration due to gravity	$T$	Temperature
$Gr_x$	local Grashof number	$T_\infty$	ambient temperature
$k_f$	thermal conductivity of the base fluid	$U(x)$	stretching/free stream
$k_s$	thermal conductivity of the nanoparticle	$(u, v)$	velocity components
$k_{nf}$	thermal conductivity of the nanofluid	$(x, y)$	cartesian coordinates
$M^2$	magnetic interaction parameter	$p$	pressure

## Greek symbols

$\phi$	volume fraction	$\mu_f$	viscosity of the base fluid
$\rho_f$	density of the base fluid	$\mu_{nf}$	viscosity of the nanofluid
$\rho_s$	density of the nanoparticle	$\alpha$	angle of inclination with the vertical
$\rho_{nf}$	density of the nanofluid	$\nu_f$	kinematic viscosity of the base fluid
$\beta_f$	volumetric expansion coefficient of the base fluid	$\nu_{nf}$	kinematic viscosity of the nanofluid
$\beta_s$	volumetric expansion coefficient of the nanoparticle	$\lambda$	mixed convection parameter

Download English Version:

<https://daneshyari.com/en/article/7698664>

Download Persian Version:

<https://daneshyari.com/article/7698664>

[Daneshyari.com](https://daneshyari.com)