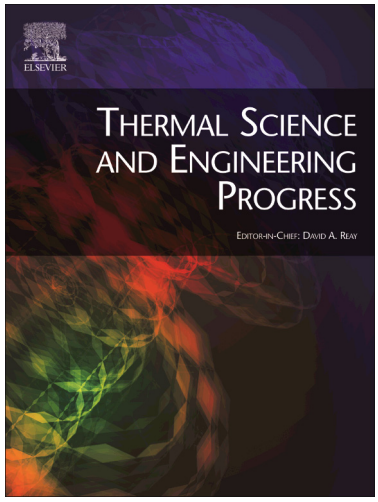

Two-Phase Modeling of Magnetic Nanofluids Jets over a Stretching/Shrinking Wall

Amin Jafarimoghaddam

PII: S2451-9049(17)30209-3
DOI: https://doi.org/10.1016/j.tsep.2018.09.008
Reference: TSEP 238

To appear in: *Thermal Science and Engineering Progress*

Received Date: 17 July 2017
Revised Date: 19 September 2018
Accepted Date: 20 September 2018

Please cite this article as: A. Jafarimoghaddam, Two-Phase Modeling of Magnetic Nanofluids Jets over a Stretching/ Shrinking Wall, *Thermal Science and Engineering Progress* (2018), doi: https://doi.org/10.1016/j.tsep.2018.09.008

Two-Phase Modeling of Magnetic Nanofluids Jets over a Stretching/Shrinking Wall

Amin Jafarimoghaddam

Independent Researcher, Tehran, Iran

Email Address: a.jafarimoghaddam@gmail.com; Phone No.: (+98) 935 665 1957

Abstract

The problem of magnetic nanofluids discharged over a stretching/shrinking wall is studied. Nanoparticles migration is subjected to significant slip mechanisms, Brownian motion and thermophoresis. Boundary condition for nanoparticles transport equation follows the steady state sense. In addition, energy equation is subjected to a convective boundary condition. For the momentum equation, it is shown that an imposed moving wall condition together with a transverse magnetic field suffices to obtain e-jet Glauert type solutions, in particular leading to dual solutions being connected to the stretching/ shrinking wall. A perturbation solution established for large magnetic parameters provides an immediate analytic insight to the nature of the momentum problem. The influence of the involved parameters on the evolution of velocity and temperature fields are shown graphically.

Keywords

Magnetic Nanofluids Jets; Stretching/Shrinking Wall; Two-Phase Modeling; Similarity Transformation

Greek

μ (H/m)	Permeability
υ (m^2/s)	Kinematic viscosity
ρ (Kg/m^3)	Fluid density
α (m^2/S)	Thermal diffusivity
ϑ (C)	Excess charge

Nomenclatures

C (Kg/m^3)	Concentration
D_B (m^2/s)	Brownian diffusivity
D_T (Kg/(m.s))	Thermophoretic diffusivity
E (N/C)	Electric field
j (C/s)	Electric current
P (Pa)	Pressure
T (K)	Temperature
T_∞ (K)	Reference temperature
V (m/s)	Velocity Vector