

Effects of suction and injection on MHD heat transfer in an electrically conducting fluid at a stretching vertical plate embedded in a porous medium with uniform free stream

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Summary. — An analysis is performed to study the effects of suction/injection and porosity on the flow and heat transfer of an incompressible viscous and electrically conducting fluid past a stretching vertical permeable surface through a highly porous medium in the presence of heat generation. The magnetic field and heat generation/absorption effects are also discussed. The resulting coupled nonlinear ordinary differential equations are solved numerically. The velocity and temperature profiles for different values of the parameters are shown graphically, in addition, the skin-friction coefficient and the rate of heat transfer at the surface are given in tabular form.

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PACS 44.20.+b – Boundary layer heat flow.

PACS 44.30.+v – Heat flow in porous media.

1. – Introduction

In recent years, the convective heat transfer over a vertical surface embedded in a porous medium has become of great interest and development. The interest of such studies is motivated by a wide range of thermal engineering applications, such as geothermal systems, oil extraction, ground pollution, thermal insulation, solid matrix heat exchangers and the storage of nuclear wastes. Transport of momentum and thermal energy in fluid saturated porous media with low porosities, such as rocks, soil, sand, etc. is commonly described by Darcy's model for conservation of momentum and by an energy equation based on the velocity field found from this model [1]. In contrast to rocks, soil, sand and other media that do fall in this category, certain porous materials, such as foam metals and fibrous media, usually have high porosity. Several researchers [2-12] investigated the natural convection in a porous medium with high porosity. Continuous surfaces are

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