NATURAL CONVECTION HEAT TRANSFER OF NANOFLUIDS OVER A CONE EMBEDDED IN SATURATED POROUS MEDIUM

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Keywords: Nanofluids, Porous medium, Isothermal flat plate, Natural convection.

Section (**Which section your paper best fits)**: **Natural and forced convection in porous media**

ABSTRACT

In present paper, free-convection heat transfer of nanofluids over a cone embedded in a saturated porous medium is examined. Free convection over geometry of cone embedded in porous media has enormous application in engineering including: packed beds in nuclear reactors, ceramic production, oil drilling, electronic systems, storage of nuclear waste. Using nanofluids in some of the mentioned applications may significantly improve thermal enhancement and performance of these systems. In spite of the importance of nanofluid and their enhanced thermophysical properties, only have few researches been done in this area. In present study, the nonlinear governing partial differential equations (PDEs) for flow and heat transfer of nanofluids over a cone embedded in a porous medium have been presented. The governing differential equations are transformed to a set of nonlinear high order ordinary differential equations by means of similarity variables, and then these equations are solved numerically. A new parameter, enhancement parameter, is introduced to analyze the enhancement of using nanoparticles. The effect of nanoparticles volume fraction, porous medium porosity, nanoparticles types, and also the effect of porous medium thermal conductivity on the heat transfer enhancement of of nanofluids is examined. The results show that not only the thermal conductivity of nanofluids significantly affects the heat transfer enhancement but also the thermal expansion coefficient and the thermal capacity of nanofluids are very important.