some problems in gas dynamics

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The aim of this thesis is to investigate threeproblems concerning the effect of external magneticfield and the non-Newtonian property on the flow ofelectrically conducting fluids near semi-infiniteplates or wedges.This thesis contains four chapters, the fristchapter is a general introduction to the problemsstudied and the necessary background Lor mechanics ofnon-Newtonian fluids. Also it contains discussionsof some previous works which are relevant to the problemsstudied in this thesis.In the second chapter, we have considered themagnetohydrodynamic boundary layer flow of anon-Newtonianfluid past a wedge. In this problem, we used the methodof successive approximation to solve the non-linear differentialequation describing the system. The numericalinvestigation we have carried out are displayed in tablesand figures which show that:(1) For constant Magnetic field M: the velocity fieldincreases with increasing power n.- ii -(2) For constant power n; the velocity field decreasesas Magnetic field M increases.(3) . For constant M; both displacement and momentumthicknesses 01 ’ 02 respectively increase as nincreases.(4) For constant n ; ,the displacement thickness 01 andmomentum thickness 02 decreases as M increases~Also, the skin-friction decreases as n’increases forconstant M and the skin-friction increases with M forconstant n.In the third chapter, the problem on magnetohydrodynamicunsteady flow of viscoelastic free convection fluid pastan infinite plate with constant suction, was investigated.In this problem we have obtained an analytical expressionfor the velocity field. from the numerical results whichwe display in tables and figures, one can see that:(1) The velocity field increases as the elastic constant kincreases for constant Magnetic field M.(2) The velocity field decreases as the Magnetic field Mincreases for constant elastic constant k.--._----- iii -Also, the skin-friction increases for constant M with increasingk and the skin-friction decreases for constant k withincreasing M.In the last chapter, we have studied the problem ofboundary layer of non-Newtonian electrically conductingfluid over a Semi-infinite flat plate under magnetic field.The velocity field was derived analytically using thepower series method as a result of the simplification introducedto linearize the basic equation for the system. Thenume~ical treatment to the analytical results leads to:(1) The velocity field increases as the non-Newtonianparameter N increases for constant Magnetic field M.(2) The velocity field decreases as Magnetic field Mincreases when the parameter N is constant.Also, the skin-friction increases for constant M withincreasingN and the skin-friction increases for constantN with increasing M.