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Abstract : This thesis is mainly concerned with the applications of the group: theoretical methods to boundary value problems. The general concept of Lie group is printed in Chapter 1. In ,Chapter 2 we demonstrate the applications of the group theoretical methods to the following boundary value -problem n,(n + 1)f''(z) ~j(z)[j''(z)r-n = 0, (1) under the boundary conditions j(O) = j(O) = 0, j(oo) = 1. (2) We shall call equation (1) the Generalized Blasius equation (GB equation) which describes the boundary layer of a non-Newtonian fluid near a semi infmite flat plate, where n is a given constant. In this chapter we obtain for any n (included the value n = 1 investigated before in [6]) the following results (i) The symmetry groups of (1), (ii) The invariant solutions of (1), . (iii) New solutions from known solution for (1), (iv) Reduce the order of (1) to a first order ordinary differential equation, (v) Transform the GB boundary value problem to an initial value problem. In Chapter 3 we develop a simple technique in attempting to give an ap- proximate analytical solution for the GB boundary value problem. The proposed solution for the value of 0 < n < 2 (the practical values of n) gives results better than the results obtained using Pohlhausens integral method [1] and very good agreement with the results of exact numerical treatment obtained by Acrivos [1]. In Chapter 4 we use the invariant solutions to obtain a solution for the linear heat conduction equation under the third type of boundary conditions. In practice this problem is known as Stokes first problem with slip velocity at boundary

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