PREFACE

The study of Dynamics of Dusty Fluids has gained considerable attention due to its wide applications in some important problems of Atmospheric, Engineering and Physiological fields. Pollution of city-air, transport of suspended solid materials in pipes, motion of aerosols in the upper atmosphere of the rotating earth etc. are some examples. Taking blood as a dusty fluid containing suspended particles (blood cells), the flow of blood through arteries can be studied with much more practical views. Due to non-linearity and coupling nature of the differential equations involved in the Dynamics of Dusty Fluids, it is not always possible to solve problems easily and so considerably little work has been done in this modern branch of Fluid-Dynamics.

The purpose of this thesis is to investigate theoretically some flow problems of practical importance as stated above. Chapter I presents the derivation of the fundamental equations of the dusty fluid flows and review of the works already done in the field with reference to the problems studied in this thesis. Chapter II discusses the boundary layer over an oscillating flat plate which gives the important idea of influence of wall on the dusty fluid. If the oscillating plate is sinusoidal wavy, then the motion induced

in the dusty fluid is dealt in Chapter III. Dusty fluid flow through two parallel plates, one stationary and the other moving, has been discussed in Chapter IV. Chapter V describes the pulsatile blood flow through slowly converging or diverging arteries. Chapter VI deals with flow of dusty fluid of arbitrary concentration through a rectangular horizontal channel due to arbitrary pressure gradient with illustrative discussion of results for the three cases of impulsive, accelerated and periodic pressure gradient. In Chapter VII, the flow of blood through elastic arteries has been discussed and the wave-velocity and damping factor have been calculated. Chapter VIII treats the two-dimensional channel flow of dusty fluid in a rotating frame which gives idea of influences of rotation on the flow. Results discussed highlight the influences of dust parameters and other parameters of the relevent problems on the fluid-motion and the dust-motion. The thesis has revealed many aspects of the interaction of fluid flows and the motion of dust particles.

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