

Part I

Fluid Mechanics

In this first part of the book we discuss problems in fluid mechanics allowing for analytical solutions of the underlying balance equations. The solutions in terms of the velocity and pressure fields in the flows may either be exact, or approximate in the sense of a boundary layer or lubrication approximation. We include linear analyses of the stability behaviour of the flows. The latter is of particular interest, e.g. in the case of two-phase flows with free surfaces in view of drop formation by the breakup of liquid jets or sheets.

One good reason for looking at fluid mechanical transport processes first is that the fluid motion may influence the transport of scalar conserved quantities, such as heat and mass, in convective processes. With the flow field given, the equations of change for thermal energy and mixture component concentration are in many cases relatively easy to solve. This is the subject of the second part of the book.