Introduction

Large numbers of publications exist, both in the open literature and within companies, presenting fundamental compressible flow data important to the engineer. The data are presented in a variety of both graphical and tabulated forms. In the authors' experience, each style of presentation has, in general, limitations in terms either of the wide increments of Mach Number, or of the small size of graphical presentation. These make interpolation less accurate than is generally desirable. Furthermore in many cases, especially in the open literature, the data are restricted to one value of specific heat ratio, and apply to air only.

This particular presentation covers increments of Mach Number that are sufficiently small to avoid the need for interpolation, and to promote the accuracy of the end result by reducing rounding errors.

The data are presented for several important types of compressible flow, namely Isentropic, Isothermal, Rayleigh, Fanno, Plane Shock and Prandtl-Meyer Expansion. For the first four of these, three values of specific heat ratio are chosen, namely 1.400, 1.333 and 1.250, to represent typical values within the temperature range 270–2000 K. The given values allow the tables to be used for air, gaseous hydrocarbon fuels and their combustion products. A correction procedure is provided to allow their use for values of the Gas Constant other than 287 J/kg K. In each case, the range of Mach Number chosen is appropriate to the particular type of flow, as indicated in the explanatory notes.

In the cases of the Plane Shock and Prandtl-Meyer Expansion, only the single value of 1.400 for specific heat ratio is given.

To enable the reader to generate values of the various functions for values of specific heat ratio and/or Mach Number other than those tabulated, the computer programs from which the tables were computed are also presented. These are written in FORTRAN 77, since this is thought likely to be the language most widely understood by readers. However, since the programs are all fairly simple, and are sufficiently annotated, conversion to another language would not be difficult.

Explanatory notes are given at the beginning of each set of tables. The various formulae used in calculating the data are stated but, in the interests of brevity, are not derived. Their derivations are, however, well documented in most standard texts on gas dynamics.

J. Palmer et al., *Compressible Flow Tables for Engineers*