

Note:

CHAPTER 15: PROGRAM

Version: 0.4.8.6 October 23, 2009

This chapter is part of the textbook:

**“Fundamentals of Compressible
Flow Mechanics”**

You can download the whole book if you like

from: *www.potto.org.*

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You should be aware that this book is updated about every a few weeks or so.

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THE LIST OF THE AVAILABLE BOOKS IN POTTO PROJECT

Project Name	Progress	Remarks	Version	Availability for Public Download	Number Downloads
Compressible Flow	beta		0.4.8.4	✓	120,000
Die Casting	alpha		0.1	✓	60,000
Dynamics	NSY		0.0.0	✗	-
Fluid Mechanics	alpha		0.1.8	✓	15,000
Heat Transfer	NSY	Based on Eckert	0.0.0	✗	-
Mechanics	NSY		0.0.0	✗	-
Open Channel Flow	NSY		0.0.0	✗	-
Statics	early alpha	first chapter	0.0.1	✗	-
Strength of Material	NSY		0.0.0	✗	-
Thermodynamics	early alpha		0.0.01	✗	-
Two/Multi phases flow	NSY	Tel-Aviv' notes	0.0.0	✗	-

NSY = Not Started Yet

APPENDIX A

Computer Program

A.1 About the Program

The program is written in a C++ language. This program was used to generate all the data in this book. Some parts of the code are in FORTRAN (old code especially for chapters 12 and 13 and not included here.¹ The program has the base class of basic fluid mechanics and utilities functions to calculate certain properties given data. The derived class are Fanno, isothermal, shock and others.

At this stage only the source code of the program is available no binary available. This program is compiled under gnu g++ in /Gnu/Linux system. As much support as possible will be provided if it is in Linux systems. NO Support whatsoever will be provided for any Microsoft system. In fact even PLEASE do not even try to use this program under any Microsoft window system.

A.2 Usage

To use the program some information has to be provided. The necessary input parameter(s), the kind of the information needed, where it has to be in a \LaTeX format or not, and in many case where it is a range of parameter(s).

¹when will be written in C++ will be add to this program.

machV The Mach number and it is used in stagnation class

fldV The $\frac{4fL}{D}$ and it is used in Fanno class isothermal class

p2p1V The pressure ratio of the two sides of the tubes

M1V Entrance Mach M1 to the tube Fanno and isothermal classes

M1ShockV Entrance Mach M1 when expected shock to the tube Fanno and isothermal classes

FLDShockV FLD with shock in the in Fanno class

M1fldV both M_1 and $\frac{4fL}{D}$ are given

M1fldP2P1V three part info $\frac{P_1}{P_2}$, M_1 and $\frac{4fL}{D}$ are given

MxV M_x or M_y

infoStagnation print standard (stagnation) info

infoStandard standard info for (Fanno, shock etc)

infoTube print tube side info for (Fanno, etc) including

infoShock print shock sides info

infoTubeShock print tube info shock main info

infoTubeProfile the Mach number and pressure ratio profiles

infoTubeShockLimits print tube limits with shock

To get the shock results in \LaTeX of M_x . The following lines have to be inserted in the end of the main function.

```
int isTex = yes;
int isRange = no;
whatInfo = infoStandard ;
variableName = MxV;
Mx = 2.0 ;
s.makeTable(whatInfo, isRange, isTex, variableName, variableValue);
```

```
*****
The following stuff is the same as above/below
if you use showResults with showHeads but the
information is setup for the latex text processing.
You can just cut and paste it in your latex file.
You must use longtable style file and dcolumn
style files.
```

```

*****
\setlongtables
\begin{longtable}
{|D..{1.4}|D..{1.4}|D..{1.4}|D..{1.4}|D..{1.4}|D..{1.4}|D..{1.4}|}
\caption{ ?? \label{?:tab:??}}\
\hline
\multicolumn{1}{|c|} {$\rule[-0.1in]{0.pt}{0.3 in}\mathbf{M} $} &
\multicolumn{1}{|c|} {$\mathbf{4fL \over D} $} &
\multicolumn{1}{|c|} {$\mathbf{P \over P^{*}} $} &
\multicolumn{1}{|c|} {$\mathbf{P_0 \over {P_0}^{*}} $} &
\multicolumn{1}{|c|} {$\mathbf{\rho \over \rho^{*}} $} &
\multicolumn{1}{|c|} {$\mathbf{U \over {U}^{*}} $} &
\multicolumn{1}{|c|} {$\mathbf{T \over T^{*}} $}

\\ \hline

\endfirsthead
\caption{ ?? (continue)} \\ \hline
\multicolumn{1}{|c|} {$\rule[-0.1in]{0.pt}{0.3 in}\mathbf{M} $} &
\multicolumn{1}{|c|} {$\mathbf{4fL \over D} $} &
\multicolumn{1}{|c|} {$\mathbf{P \over P^{*}} $} &
\multicolumn{1}{|c|} {$\mathbf{P_0 \over {P_0}^{*}} $} &
\multicolumn{1}{|c|} {$\mathbf{\rho \over \rho^{*}} $} &
\multicolumn{1}{|c|} {$\mathbf{U \over {U}^{*}} $} &
\multicolumn{1}{|c|} {$\mathbf{T \over T^{*}} $}

\\ \hline
\endhead
2.176& 2.152& 0.3608& 1.000& 0.5854& 3.773& 0.6164 \\
\hline\end{longtable}

```

A.3 Program listings

Can be download from www.potto.org.

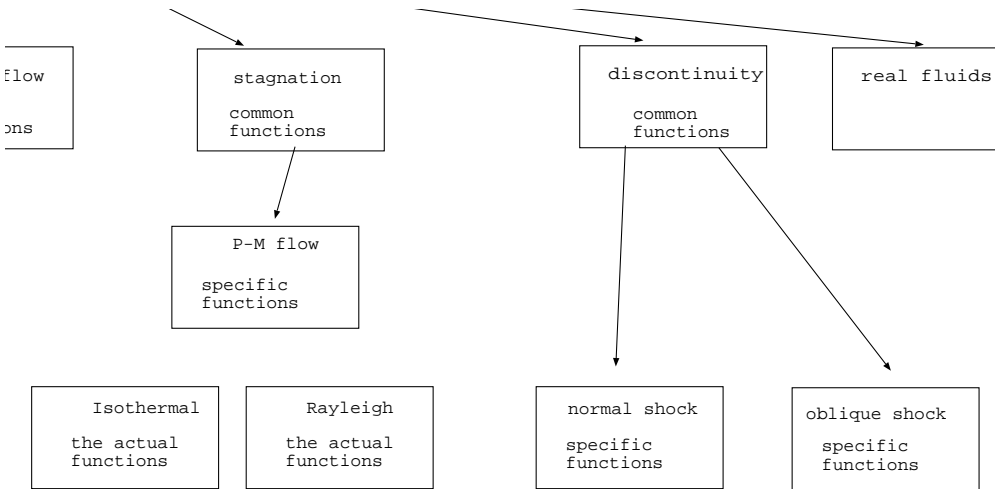


Fig. -A.1. Schematic diagram that explains the structure of the program