

# Note:

CHAPTER 2: PROGRAM

Version: 0.4.8.8    January 1, 2012

This chapter is part of the textbook:

**“Fundamentals of Compressible  
Flow”**

**You can download the whole book if you like  
from: *www.potto.org*.**

*This chapter is under GDL with a minor modifi-  
cations. Potto License is no longer applied.*

*Please be aware that this book is updated fre-  
quently — every three weeks or so.*

GENICK BAR-MEIR, PH.D.  
CHICAGO, ILLINOIS  
JANUARY 1, 2012

## THE LIST OF THE AVAILABLE BOOKS IN POTTO PROJECT

<b>Project Name</b>	<b>Progress</b>	<b>Remarks</b>	<b>Version</b>	<b>Availability for Public Download</b>
Compressible Flow	beta		0.4.8.6	✓
Gas Dynamics Tables	final	World biggest	1.2	✓
Die Casting	alpha		0.1.2	✓
Dynamics	NSY		0.0.0	✗
Fluid Mechanics	beta		0.2.9	✓
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's 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.<sup>1</sup> 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).

---

<sup>1</sup>when 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 can 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](http://www.potto.org).

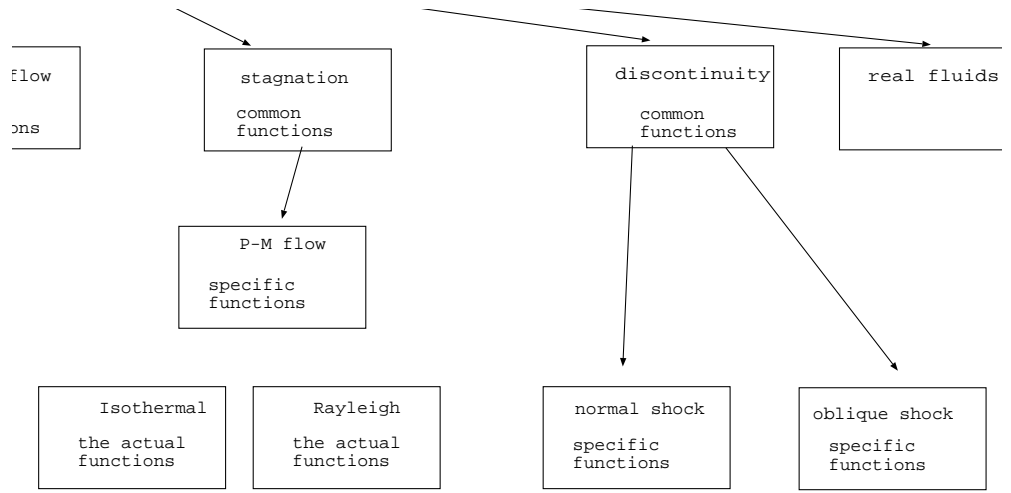


Fig. -A.1. Schematic diagram that explains the structure of the program