

# Note:

CHAPTER 16: INDEX

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*.

*This chapter is under GDL with a minor modifications. Potto License is no longer applied*

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

GENICK BAR-MEIR, PH.D.  
MINNEAPOLIS, MINNESOTA  
OCTOBER 23, 2009

## 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>	<b>Number Downloads</b>
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

## Subjects Index

- A**  
 adiabatic nozzle, 58  
 airbag, 234  
 angle of attack, 309
- B**  
 Balloon Problem, 245  
 Bar-Meir's solution to Oblique shock, 8  
 Bernoulli's equation, 40
- C**  
 chamber controlled volume, 249  
 classifications of chambers, 234  
 converging–diverging nozzle, 53
- D**  
 d'Alembert's Paradox, 308  
 Darcy friction factor, 159  
 de Laval, Carl Gustaf Patrik, 9  
 deflection angle, 258  
 deflection angle range, 274  
 deLaval's nozzle, *see* de Laval, Carl Gustaf Patrik  
 detached shock, 280  
 diffuser efficiency, 147  
 discontinuity, 1
- E**  
 Eckert number, 10  
 Emanuel's partial solution to oblique shock, 8  
 External flow, 12
- F**  
 Fanning Friction factor, 159  
 fanno  
   second law, 179  
 Fanno flow, 12  
 fanno flow, 177,  $\frac{4fL}{D}$  181  
   choking, 182  
   average friction factor, 183  
   entrance Mach number calculations, 191, 209  
   entropy, 182  
   shockless, 189, 190  
   star condition, 184  
 Fliegner, 3  
 Fliegner experiment, 9  
 friction factor, 12
- G**  
 Gibbs, function, 44  
 gravity, 153
- H**  
 Hydraulic Jump, *see* discontinuity
- I**  
 internal energy, 5  
 intersection of Fanno and Rayleigh lines, 7  
 Isothermal Flow, 2, 3, *see* Shapiro flow  
 isothermal flow, 157  
   entrance issues, 163  
   entrance length limitation, 163  
   maximum,  $\frac{4fL}{D}$  162  
   table, 167
- L**  
 large deflection angle, 265  
 line of characteristic, 305  
 long pipe flow, 157
- M**  
 Mach, 3  
 maximum deflection angle, 267  
 maximum turning angle, 307  
 Meyer, Theodor, 20  
 Moody diagram, 12  
 moving shock, 9  
   piston velocity, 113  
   solution for closed valve, 110  
   stagnation temperature, 106

**N**

NACA 1135, 8, 259  
 negative deflection angle, 258  
 normal components, 260  
 nozzle efficiency, 147

**O**

Oblique shock  
   stability, 298  
 oblique shock  
   conditions for solution, 263  
   normal shock, 257  
   Prandtl–Meyer function, 257  
 oblique shock governing equations, 261  
 Oblique shock stability, 8  
 opening valve problem, 133

**P**

Partially open valve, 121  
 perpendicular components, 260  
 piston velocity, 113  
 Prandtl–Meyer flow, 301  
 Prandtl–Meyer function  
   small angle, 301  
   tangential velocity, 304

**R**

Rayleigh Flow, 11  
   negative friction, 219  
 Rayleigh flow, 219  
 rayleigh flow, 219  
   entrance Mach number, 229  
   second law, 222  
   tables, 223  
   two maximums, 221  
 Romer, *see* isothermal nozzle

**S**

science disputes, 5  
 semi rigid chamber, 234  
 semirigid tank  
   limits, 235  
 Shapiro Flow, 3  
 Shapiro flow, 12  
 shock angle, 262

shock drag, *see* wave drag  
 Shock in cylindrical coordinates, 118  
 Shock in spherical coordinates, 118  
 shock tube, 129  
 shock wave, 93  
   perturbation, 102  
   solution, 98  
   star velocity, 99  
   table  
     basic, 134  
     thickness, 102  
     trivial solution, 98  
 small deflection angles, 278  
 sonic transition, 62  
 speed of sound, 4  
   ideal gas, 41  
   linear temperature, 43  
   liquid, 47  
   real gas, 44  
   solid, 49  
   star, 57  
   steam table, 42  
   two phase, 49  
 speed of sound, what, 40  
 stagnation state, 53  
 strong solution, 264  
 supersonic tunnel, 148

**T**

table  
   shock choking, 118  
   shock wave  
     partial close valve, 126  
 Taylor–Maccoll flow, 278  
 throat area, 62

**U**

Upsteam Mach number, 273

**V**

Velocity–temperature diagram, 32  
 von Neumann paradox, 257

**W**

weak solution, 264

**Y**

Young's Modulus, 49

**Z**

zero deflection angle, 272

## Authors Index

### B

Boyle, Robert, 4

### C

Challis, 5

Converdill, 10

### E

Eckert, E.R.G, 10

### F

Fanno, Gino Girolamo, 7

### G

Galileo Galilei, 4

### H

Henderson, 285

Hugoniot, Pierre Henri, 6

### K

Kutta-Joukowski, 13

### L

Landau, Lev, 7

Leonardo Da Vinci, 4

### M

Mach, Ernest, 5

Menikoff, 285

Mersenne, Marin, 4

Meyer, Theodor, 7

Moody, 5

### N

Newton, 4

### O

Owczarek, 241

### P

Poisson, 5, 6

Prandtl, Ludwig, 4, 13

### R

Rankine, John Macquorn, 6

Rayleigh, 5

Riemann, 5

Rouse, 5

### S

Shapiro, 4

Spalding, 32

Stodola, 7, 32

Stokes, 5

### T

Taylor, G. I., 7

### V

Van Karman, 4

### W

Wright brothers, 13