Scilab Textbook Companion for Fluid Power Theory & Applications by J. Sullivan[1]

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July 31, 2019

[1]Funded by a grant from the National Mission on Education through ICT, http://spoken-tutorial.org/NMEICT-Intro. This Textbook Companion and Scilab codes written in it can be downloaded from the "Textbook Companion Project" section at the website http://scilab.in

Book Description

Title: Fluid Power Theory & Applications

Author: J. Sullivan

Publisher: Reston Publishing Company

Edition: 4

Year: 2007

ISBN: 0137555881

Scilab numbering policy used in this document and the relation to the above book.

Exa Example (Solved example)

Eqn Equation (Particular equation of the above book)

AP Appendix to Example(Scilab Code that is an Appednix to a particular Example of the above book)

For example, Exa 3.51 means solved example 3.51 of this book. Sec 2.3 means a scilab code whose theory is explained in Section 2.3 of the book.

Contents

List of Scilab Codes

Chapter 2

Applying Hydraulic Principles To Single Acting Linear Systems

Scilab code Exa 2.1 Horsepower expended

```
clc
//initialisation of variables
F= 1500 //lb
L= 54 //IN
t= 12 //sec
//CALCULATIONS
hp= F*L/(t*6600)
//RESULTS
printf ('Horsepower expended at the output = %.2f hp
    ',hp)
```

Scilab code Exa 2.2 time required

```
clc
```

```
//initialisation of variables
F= 1500 //lb
t1= 10 //sec
F1= 1200 //lb
//CALCULATIONS
t2= F*t1/F1
//RESULTS
printf ('time required to raise the load = %.1f sec'
    ,t2)
```

Scilab code Exa 2.3 Pressure within the system

```
clc
//initialisation of variables
d= 2 //in
F= 1000 //lb
t= 10 //sec
L= 48 //in
S= 24 //in
//CALCULATIONS
ohp= F*L/(t*6600)
Ac= %pi*d^2/4
P= ohp*t*6600/(S*Ac)
//RESULTS
printf ('Pressure within the system = %.f psi',P)
```

Scilab code Exa 2.4 Fluid horsepower

```
clc
//initialisation of variables
P= 1000 //psi
Q= 3 //gpm
//CALCULATIONS
```

```
Fhp= P*Q/(1714)
//RESULTS
printf ('Fluid horsepower = %.2f hp',Fhp)
```

Scilab code Exa 2.5 overall efficiency

```
clc
//initialisation of variables
Fi= 25 //lb
li= 12 //in
ni= 30
ti= 60 //sec
F0= 1000 //lb
Lo= 6 //in
to= 60 //sec
//CALCULATIONS
lhp= Fi*li*ni/(ti*6600)
Ohp= F0*Lo/(to*6600)
eo= Ohp*100/lhp
//RESULTS
printf ('overall efficiency = %.f percent',eo)
```

Scilab code Exa 2.6 Slip

```
clc
//initialisation of variables
vp= 0.75 //in^3
n= 9 //strokes
t= 10 //sec
d= 2 //in
Sc= 2 //in
//CALCULATIONS
Qt= vp*n/(t*3.85)
```

```
Ac= %pi*d^2/4
Qa= Ac*Sc/(t*3.85)
s= Qt-Qa
s1= (1-(Qa/Qt))*100
ev= Qa*100/Qt
//RESULTS
printf ('Slip = %.3f gpm',s)
printf (' \n Slip perecentage= %.f percent',s1)
printf (' \n volumetric efficiency = %.f perecnt',ev
   )
```

Scilab code Exa 2.7 Electro-mechanical efficiency

```
clc
//initialisation of variables
eo= 87
em= 94
//CALCULATIONS
ee= eo*100/em
//RESULTS
printf ('Electro-mechanical efficiency = %.f percent
   ',ee)
```

Chapter 3

Determining the properties of fluids

Scilab code Exa 3.1 weight

```
clc
//initialisation of variables
M= 5//slug
g= 32 //ft/sec^2
M1= 10 //kg
g1= 9.8 //m/sec^2
M2= 15 //gm
g2= 980 //cm/sec^2
//CALCULATIONS
W= M*g
W1= M1*g1
W2= M2*g2
//RESULTS
printf ('weight = %.f lb',W)
printf ('\n weight = %.f N',W1)
printf ('\n weight = %.f dyn',W2)
```

Scilab code Exa 3.2 density

```
clc
//initialisation of variables
M= 20 //grams
V= 25 //mm^3
//CALCULATIONS
d= M/V
d1= M*0.001/(V*0.000001)
d2= M*0.0022/(V*0.00003531)
//RESULTS
printf ('density = %.2f gm/cm^3',d)
printf ('\n density = %.f kg/m^3',d1)
printf ('\n density = %.1f slugs/ft^3',d2)
```

Scilab code Exa 3.3 specific weight

```
clc
//initialisation of variables
W= 7200 //lb
V= 120 //ft^3
W1= 3600 //lb
V1= 50 //m^3
W2= 500 //dyn
V2= 7000 //cm^3
//CALCULATIONS
s= W/V
s1= W1/V1
s2= W2/V2
//RESULTS
printf ('specific weight = %.f lbs/ft^3',s)
printf ('\n specific weight = %.f N/m^3',s1)
printf ('\n specific weight = %.4f dyn/cm^3',s2)
```

Scilab code Exa 3.4 Pressure

```
clc
//initialisation of variables
F= 200 //lb
A= 4 //in^2
//CALCULATIONS
P= F/A
//RESULTS
printf ('Pressure = %.f psi',P)
```

Scilab code Exa 3.5 Force

```
clc
//initialisation of variables
P= 1500 //psi
A= 2//in^2
//CALCULATIONS
F= P*A
//RESULTS
printf ('Force = %.f lb',F)
```

Scilab code Exa 3.6 Pressure

```
clc
//initialisation of variables
s= 0.85
h= 50 //ft
//CALCULATIONS
```

```
P= s*h*0.433
//RESULTS
printf ('Pressure = %.1f psi',P)
```

Scilab code Exa 3.7 head

```
clc
//initialisation of variables
P= 1500 //psi
d= 0.78
//CALCULATIONS
h= P*2.31/d
//RESULTS
printf ('head = %.1f ft',h)
```

Scilab code Exa 3.8 kinematic viscosity

```
clc
//initialisation of variables
k= 0.1200
t= 225 //sec
d= 0.82
//CALCULATIONS
v= t*k
u= v*d
//RESULTS
printf ('kinematic viscosity = %.1f cP',u)
```

Scilab code Exa 3.9 equivalent viscosity

```
clc
//initialisation of variables
t= 80 //sec
//CALCULATIONS
v= 0.226*t-(195/t)
v1= 0.00035*t-(0.303/t)
//RESULTS
printf ('equivalent viscosity = %.2f cst',v)
printf (' \n equivalent viscosity = %.3f newtons',v1
   )
```

Scilab code Exa 3.11 coefficient of friction

```
clc
//initialisation of variables
F= 45 //gm
L= 20000//gm\
r= 7.86
s= 1.27
//CALCULATIONS
CF= (F/L)*(r/s)*2*sqrt(2)
//RESULTS
printf ('coefficient of friction = %.3f ',CF)
```

Chapter 4

applications and testing of seals and packings

Scilab code Exa 4.1 Groove diameter

```
clc
//initialisation of variables
d= 4 //in
p= 20 //percent
d1= 0.140
//CALCULATIONS
Gd= d-2*((100-20)*d1/100)
Gw= d1+2*(p*d1/100)
//RESULTS
printf ('Groove diameter = %.3f in',Gd)
printf (' \n Groove width = %.3f in',Gw)
printf (' \n outside diameter = %.f in',d)
```

Scilab code Exa 4.2 thickness

```
clc
```

```
//initialisation of variables
D= 2 //in
S= 10 //in
s= 10000 //strokes
V= 231 //in^3
//CALCULATIONS
di= V/(S*s*D*%pi)
//RESULTS
printf ('thickness = %.7f in',di)
```

Scilab code Exa 4.3 `final available squeeze`

```
clc
//initialisation of variables
d= 0.275 //in
p= 15
p1= 20
p3= 8
//CALCULATIONS
Fs= (d*p/100)+(d*p1/100)-(d*p3/100)
Fs1= Fs*100/d
//RESULTS
printf ('final  available squeeze = %.2f percent',Fs1)
```

Chapter 5

Accounting for the energy in hydraulic systems

Scilab code Exa 5.1 velocity of fluid in the conductor

```
clc
//initialisation of variables
Q= 40 //gpm
d= 2 //in
d1= 4 //in
//CALCULATIONS
v1= Q*4/(%pi*d^2*3.12)
v2= %pi*v1*4/(%pi*d1^2)
//RESULTS
printf ('velocity of fluid in the conductor = %.2f
   fps',v1)
printf (' \n  velocity of fluid in a maniflod = %.2f
    fps',v2)
```

Scilab code Exa 5.2 minnimum diameter

```
clc
//initialisation of variables
Q= 18 //gpm
d= 2 //in
v2= 10 //fps
//CALCULATIONS
v1= Q*4/(%pi*d^2*3.12)
d2= sqrt(4*Q/(%pi*v2*3.12))
//RESULTS
printf ('minnimum diameter = %.3f in',d2)
```

Scilab code Exa 5.3 `veloctity`

```
clc
//initialisation of variables
Q= 10 //gpm
d= 1 //in
//CALCULATIONS
v= Q*4/(%pi*d^2*3.12)
//RESULTS
printf ('veloctity = %.1f fps',v)
```

Scilab code Exa 5.4 `pressure`

```
clc
//initialisation of variables
S= 0.91
g= 32.2 //ft/sec^2
P1= 1000 //psi
Q= 500 //gpm
d= 3 //in
d1= 1 //in
//CALCULATIONS
```

```
v1= Q*4/(3.12*%pi*d^2)
v2= Q*4/(%pi*d1^2*3.12)
P2= ((P1*2.31/S)+(v1^2/(2*g))-(v2^2/(2*g)))*(S/2.31)
//RESULTS
printf ('pressure = %.f psi',P2-1)
```

Scilab code Exa 5.5 energy exptracted from the fluid

```
clc
//initialisation of variables
P1= 1000 //psi
S= 0.85
P2= 350 //psi
Hl= 679.41 //ft
//CALCULATIONS
Ha= P1*2.31/S
He= Ha-(P2*2.31/S)-Hl
//RESULTS
//RESULTS
printf ('energy exptracted from the fluid = %.2f ft',He)
```

Scilab code Exa 5.6 velocty of the fluid

```
clc
//initialisation of variables
g= 32 //ft/sec^2
h= 40 //ft
//CALCULATIONS
v= sqrt(2*g*h)
//RESULTS
printf ('velocty of the fluid = %.1f fps',v)
```

Scilab code Exa 5.7 friction coefficient for the orifice

```
clc
//initialisation of variables
Q= 1000 //gpm
d= 2 //in
S= 0.85
dp= 120 //psi
//CALCULATIONS
Cf= (1/38.06)*(Q*4/(%pi*d^2))*sqrt(S/dp)
//RESULTS
printf ('friction coefficient for the orifice = %.2f
    ',Cf)
```

Scilab code Exa 5.8 Reynolds number

```
clc
//initialisation of variables
Q= 100 //gpm
d= 1 //in
kv= 0.05 //N
//CALCULATIONS
v= Q*4/(3.12*%pi*d^2)
Nr= (12*v*d)/kv
//RESULTS
printf ('Reynolds number = %.f ',Nr+5)
```

Scilab code Exa 5.9 Critical velocity

```
clc
//initialisation of variables
v= 27 //cp
s= 0.85
d= 1 //in
//CALCULATIONS
V= v/s
V1= V*0.001552
V2= 2000*V1/(12*d)
V3= 4000*V1/(12*d)
//RESULTS
printf ('Critical velocity = %.2f fps',V3)
```

Scilab code Exa 5.10 Pressure drop

```
clc
//initialisation of variables
Q= 200 //gpm
d= 2 //in
S= 0.91
f= 0.05
L= 800 //ft
g= 32.2 //ft/sec^2
//CALCULATIONS
v= Q*4/(%pi*3.12*d^2)
h= 2.598*S*f*L*v^2/(2*g)
//RESULTS
printf ('Pressure drop = %.f psi',h)
```

Scilab code Exa 5.11 Pressure drop

```
clc
//initialisation of variables
```

```
Q= 15 //gpm
d= 1 //in
s= 0.85
v= 0.08 //N
L= 400 //ft
//CALCULATIONS
V= Q*4/(%pi*d^2*3.12)
Nr= 12*V*2*d/v
h= .43*s*v*L*V/d^2
//RESULTS
printf ('Pressure drop = %.2f psi',h)
```

Scilab code Exa 5.12 Pressure drop

```
clc
//initialisation of variables
Q= 1000 //gpm
d= 2 //in
V= 0.30 //N
L= 500 //ft
f= 0.034
S= 0.85
g= 32.2 //ft/sec^2
//CALCULATIONS
v= Q*4/(%pi*3.12*d^2)
Nr= (12*v*d)/V
h= 2.598*S*f*L*v^2/(2*g)
//RESULTS
printf ('Pressure drop = %.f psi',h+5)
```

Scilab code Exa 5.13 equivalent length

```
clc
```

```
//initialisation of variables
Q= 500 //gpm
d= 2 //in
S= 0.91
kv= 0.25 //N
r= 0.0012
K= 3
f= 0.04
//CALCULATIONS
v= Q*4/(%pi*d^2*3.12)
Nr= (v*d*12)/kv
Rr= 12*r/d
Le= K*d/(f*12)
//RESULTS
printf ('equivalent length = %.1f ft',Le)
```

Chapter 6

Characteristics of rotary pumps

Scilab code Exa 6.1 `input torque`

```
clc
//initialisation of variables
P= 2500 //psi
Q= 3 //gpm
p= 5 //Bhp
N= 1725 //rpm
//CALCULATIONS
eo= P*Q*100/(1714*p)
To= p*5250/N
//RESULTS
printf ('input torque = %.2f lb-ft',To)
```

Scilab code Exa 6.2 `volumetric efficiency`

```
clc
//initialisation of variables
Q= 52 //gpm
v= 3.75 //in^3
```

```
N= 3300 //rpm
//CALCULATIONS
ev= 231*Q*100/(v*N)
//RESULTS
printf ('volumetric efficiency = %.2f percent',ev)
```

Scilab code Exa 6.3 mechanical efficiency

```
clc
//initialisation of variables
eo= 87 //percent
ev= 94 //percent
p= 10 //bhpi
//CALCULATIONS
em= eo/ev
em1= em*100
Fhp= p*(1-em)
//RESULTS
printf ('frictional horsepower = %.1f hp',Fhp+0.1)
printf (' \n mechanical efficiency = %.2f percent',
   em1)
```

Scilab code Exa 6.4 volume flow rate

```
clc
//initialisation of variables
n= 9
N= 3000 //rpm
s= 0.75 //inch
d= 0.5 //inch
//CALCULATIONS
Q= n*N*s*%pi*d^2/(4*231)
//RESULTS
```

```
printf ('volume flow rate = %.1f gpm',Q)
```

Scilab code Exa 6.5 `minimum size of the reservoir`

```
clc
//initialisation of variables
d= 6 //in
N= 120 //in
Q= 5 //gpm
//CALCULATIONS
Vc= %pi*d^2*N/(4*231)
//RESULTS
printf ('minimum size of the reservoir = %.2f gpm',
  Vc)
```

Chapter 7

Valves in hydraulic transmission control

Scilab code Exa 7.1 `flow coefficient`

```
clc
//initialisation of variables
Q= 30 //gpm
dp= 300 //psi
S= .85
Cv= 5.41 //
//CALCULATIONS
Cv1= Q/(sqrt(dp/S))
dp1= S*Q^2/Cv^2
//RESULTS
printf ('flow coefficient = %.3f gpm',Cv1)
printf (' \n pressure drop = %.f psi',dp1)
```

Chapter 8

Characteristics of Actuators

Scilab code Exa 8.1 size of the cylinder postion

```
clc
//initialisation of variables
F= 80000 //lbs
P= 1600 //psi
//CALCULATIONS
db= sqrt(4*F/(%pi*P))
//RESULTS
printf ('size of the cylinder postion = %.f in',db)
```

Scilab code Exa 8.2 Cylinder velocity

```
clc
//Initialization ogf variables
Q=25 //gpm
A=.533 //in^2
//Calculations
nu=Q*19.25/(A*60) //Fluid velocity
nucylinder=Q*19.25/12.56 //Cylinder velocity
```

```
//Results
printf ('Fluid velocity = %.2f',nu)
printf ('\n Cylinder velocity = %.2f',nucylinder)
```

Scilab code Exa 8.3 length of the stop tube

```
clc
//initialisation of variables
d= 3 //in
P= 2000 //psi
s= 20 //strokes
//CALCULATIONS
Cl= s*d/2
F= P*%pi*d^2/4
stl= (Cl-40)/10
//RESULTS
printf ('length of the stop tube= %.f in',Cl)
printf (' \n thrust on the rod= %.f lb',F+3)
printf (' \n Stop Tube length= %.f stl',stl)
```

Scilab code Exa 8.4 total force decessary to decelarate the load

```
clc
//initialisation of variables
v= 120 //ft/min
S= 1.5 //in
w= 8000 //lb
//CALCULATIONS
ga= v^2*0.0000517/S
F= w*ga
//RESULTS
printf ('total force decessary to decelarate the
   load= %.f lb',F-3)
```

Scilab code Exa 8.5 `total force decessary to decelarate the load`

```
clc
//initialisation of variables
P= 750 //psi
d= 3 //in
w= 1500 //lb
ga= 0.172
f= 0.12
v= 50 //ft/min
s= 0.75 //in
//CALCULATIONS
Fa= P*%pi*d^2/4
F= w*(ga-f)+Fa
//RESULTS
printf ('total force decessary to decelarate the
   load= %.f lb',F-2)
```

Scilab code Exa 8.6 `pressure in the cylinder`

```
clc
//initialisation of variables
d= 3 //in
d1= 1.5 //in
F= 7500 //lb
//CALCULATIONS
A1= (%pi/4)*(d^2-d1^2)
P= F/A1
//RESULTS
printf ('pressure in the cylinder = %.f psi',P-1)
```

Scilab code Exa 8.7 Theotrical torque

```
clc
//initialisation of variables
P= 2000 //psi
Vm= 0.5 //in^3
//CALCULATONS
T= P*Vm*0.16
//RESULTS
printf ('Theotrical torque = %.f lb-in',T)
```

Scilab code Exa 8.8 Theotrical speed of fluid power

```
clc
//initialisation of variables
Q= 7.5 //gpm
Vm= 2 //in^3
//CALCULATIONS
N= 231*Q/Vm
//RESULTS
printf ('Theotrical speed of fluid power = %.f rpm',
   N)
```

Scilab code Exa 8.9 effective flow rate

```
clc
//initialisation of variables
Vm= 0.55 //in^3
N= 3400 //rpm
```

```
//CALCULATIONS
Q= Vm*N/231
//RESULTS
printf ('effective flow rate = %.2f gpm',Q)
```

Scilab code Exa 8.10 overall efficiency

```
clc
//initialisation of variables
T= 32 //lb-ft
N= 1200 //rpm
P= 2000 //psi
Q= 7.5 //gpm
//CALCULATIONS
eo= T*N*100/(P*Q*3.06)
//RESULTS
printf ('overall efficiency = %.f percent',eo)
```

Scilab code Exa 8.11 Case drain loss

```
clc
//initialisation of variables
Vm= 0.6 //in^3
N= 2400 //rpm
Qa= 6.5 //gpm
p= 50
//CALCULATIONS
ev= Vm*N*100/(Qa*231)
Tf= (100-ev)*Qa/100
Cl= p*Tf/100
//RESULTS
printf ('Case drain loss = %.3f gpm',Cl)
```

Scilab code Exa 8.12 `mechanical efficency`

```
clc
//initialisation of variables
eo= 88 //perecent
ev= 97 //percent
//CALCULATIONS
em= eo*100/ev
//RESULTS
printf ('mechanical efficency = %.2f percent',em)
```

Chapter 9

Hydraulic system components

Scilab code Exa 9.1 total Btu heat loss

```
clc
//initialisation of variables
t= 4 //hr
Ihp= 8 //ihp
Ohp= 5 //hp
//CALCULATIONS
Hl= t*2544*(Ihp-Ohp)
//RESULTS
printf ('total Btu heat loss over a period of 4hr =
   %.f Btu',Hl)
```

Scilab code Exa 9.2 rise in temperature of the fluid

```
clc
//initialisation of variables
t= 1 //sec
P= 1000 //psi
Q= 3 //gpm
```

```
Sg= 0.85
s= 0.42
//CALCULATIONS
Hl= 2544*t*P*Q/1714
Wf= 62.4*Q*60*Sg
Tr= Hl/(Wf*s)
//RESULTS
printf ('rise in temperature of the fluid = %.2f F',
    Tr)
```

Scilab code Exa 9.3 Stroke length

```
clc
//initialisation of variables
P= 1500 //psi
d= 12 //in
V= 50 //gal
//CALCULATIONS
F= P*(%pi*d^2/4)
S= V*231*4/(%pi*d^2)
//RESULTS
printf ('Weight = %.f lb',F)
printf ('Stroke length = %.1f in',S)
```

Scilab code Exa 9.4 Size of accumulator

```
clc
//initialisation of variables
P= 1500 //psig
V= 5 //gal
P1= 3000 //psig
P2= 2000 //psig
//CALCULATIONS
```

```
V2= V*231*(P2+14.7)/(P1-P2)
V1= V2*(P1+14.7)/((P+14.7)*231)
//RESULTS
printf ('Size of accumulator = %.2f gal',V1)
```

Scilab code Exa 9.5 `percentage difference in volume`

```
clc
//Initialization of variables
beta=1.4
p3=2000+14.7 //non guage
p2=3000+14.7 //non guage
p1=1500+14.7 //non guage
deltav=1155
//Calculations
v2=(p3/p2)^(1/beta) *(deltav) /(1-(p3/p2)^(1/beta))
v1=v2*(p2/p1)^(1/beta)
perdiff=(v1-4627.25)*100/v1
//Results
printf('volume 2 = %.1f',v2)
printf('\n volume 1 = %.1f',v1)
printf('\n percentage difference in volume = %.2f',
    perdiff)
```

Scilab code Exa 9.6 `Wall thcikness`

```
clc
//initialisation of variables
Fr= 20 //gpm
P= 2500 //psi
sf= 4
Ts= 55000 //psi
V= 15 //fps
```

```
//CALCULATIONS
A= Fr*0.3208/V
ID= 2*sqrt(A/%pi)
Wt= P*ID/(2*(Ts-P))
Wt1= Wt*sf
//RESULTS
printf ('Wall thcikness = %.3f in',Wt1)
```

Chapter 11

Introduction to Pneumatics

Scilab code Exa 11.1 Guage pressure

```
clc
//initialisation of variables
V1= 20 //gal
P1= 20 //psi
n= 2
//CALCULATIONS
V2= V1/n
P2= (P1+14.7)*V1*231/(V2*231)
P3= P2-14.7
//RESULTS
printf ('Guage pressure = %.1f psi',P3)
```

Scilab code Exa 11.2 volume the heated gas will occupy

```
clc
//initialisation of variables
V1= 1500 //in^3
T= 80 //F
```

```
T1= 200 //F
//CALCULATIONS
V2= V1*(460+T1)/(T+460)
//RESULTS
printf ('volume the heated gas will occupy = %.1f in
   ^3',V2)
```

Scilab code Exa 11.3 guage pressure

```
clc
//initialisation of variables
P1= 2000 //in^3
T= 80 //F
T1= 250 //F
//CALCULATIONS
P2= (P1+14.7)*(460+T1)/(T+460)
P3= P2-14.7
//RESULTS
printf ('guage pressure = %.f psi',P3)
```

Scilab code Exa 11.4 guage pressure

```
clc
//initialisation of variables
P1= 2000//psi
V1= 1500 //in^3
T2= 250 //F
T1= 75 //F
V2= 1000 //in^3
//CALCULATIONS
P2= (P1+14.7)*V1*(T2+460)/((T1+460)*V2)
P3= P2-14.7
//RESULTS
```

```
printf ('guage pressure = %.f psi',P3)
```

Scilab code Exa 11.5 air consumption in cfm of free air

```
clc
//initialisation of variables
s= 10 //stroke
d= 2 //in
r= 40 //cpm
P1= 80 //psi
//CALCULATIONS
V1= %pi*d^2*s*r/(4*1728)
V2= (P1+14.7)*V1/14.7
//RESULTS
printf ('air consumption in cfm of free air = %.2f
   cfm free air',V2)
```

Scilab code Exa 11.6 Pressure drop

```
clc
//initialisation of variables
V= 650 //cfm
Cr= 250 //psi
d= 2 //in
L= 500 //ft
//CALCULATIONS
CR= (Cr+14.7)/14.7
pf= 0.1025*L*(V/60)^2/(CR*d^(5.31))
//RESULTS
printf ('Pressure drop = %.f psi',pf-1)
```

Scilab code Exa 11.7 Amount of air passing thorugh orifice

```
clc
//initialisation of variables
d= 1 //in
P= 100 //psi
C= 1
T= 70 //F
s= 0.07494 //lb/ft^3
//CALCULATIONS
Qw= (0.5303*%pi*d^2*(P+14.7))/(4*sqrt(T+460))
Qv= Qw*60/s
//RESULTS
printf ('Amount of air passing thorugh orifice = %.1
   f cfm',Qv)
```

Scilab code Exa 11.8 Size of reservoir

```
clc
//initialisation of variables
t= 5 //min
Qr= 10 //cfm
P1= 125 //psi
P2= 100 //psi
//CALCULATIONS
Vr= Qr*t*14.7/(P1-P2)
//RESULTS
printf ('Size of reservoir = %.1f ft^3',Vr)
```