

```
<html><head><title>Q1</title>
<link rel="stylesheet" type="text/css"
href="/phoenics/d_polis/polstyle.css">
</head><body><pre><strong>
TALK=T;RUN( 1, 1)
```

```
*****
Q1 created by VDI menu, Version 2015, Date 29/03/16
CPVNAM=VDI; SPPNAM=FLAIR
```

```
*****
Echo DISPLAY / USE settings
*****
IRUNN = 1 ;LIBREF = 0
*****
```

```
Group 1. Run Title
TEXT(Pollutant-gas dispersion from a building)
*****
```

Echo save-block settings for Group 1  
savelbegin  
The case considered is pollutant gas dispersion into the atmosphere from a roof-top vent on an isolated building.

The pollutant gas is discharged vertically upwards at 50degC from a rectangular vent into an ambient wind field at 20degC. The inlet densimetric Froude number is unity, and the molecular mass of the gas is the same as ambient air. The ratio of the reference wind speed to the exhaust-plume velocity is 2.5. The mass fraction of the incoming pollutant C1 is set to unity at the discharge plane.

A WIND object is used to specify a northerly wind whose log-law inlet profiles define a neutral atmospheric boundary layer with a terrain roughness height of 0.03m, and a wind speed of 2.5m/s at the reference height of 10m. The turbulence is represented by the Chen-Kim variant of the k-e turbulence model. The turbulent Schmidt number for the pollutant gas is set equal to 0.7.

The WIND object automatically applies fully-rough wall functions on the ground plane and fixed-pressure conditions on the sky, side and outlet boundaries. The sky boundary also employs a diffusive boundary condition consistent with a uniform wind shearing stress.

The In-Form facility is used to provide tabular printout to a MS Excel file (.csv format) of the absolute velocity and pollutant mass fraction for 3 different locations. In-Form is also used to create a variable named C1PM, which computes and stores for plotting purposes the local pollutant concentration in ppm by mass.

For future flexibility of extending the case to other wind directions, the one-half symmetry of the present case has not been exploited in the simulation.

```
savelend
*****
Group 2. Transience
```

```

STEADY = T
*****
  Groups 3, 4, 5  Grid Information
    * Overall number of cells, RSET(M,NX,NY,NZ,tolerance)
RSET(M,65,45,25)
*****
  Group 6. Body-Fitted coordinates
*****
  Group 7. Variables: STORED,SOLVED,NAMED
    * Non-default variable names
NAME(145)=VABS ;NAME(146)=TEM1
NAME(147)=EPKE ;NAME(148)=DEN1
NAME(149)=EL1 ;NAME(150)=ENUT
    * Solved variables list
SOLVE(P1,U1,V1,W1,C1,TEM1)
    * Stored variables list
STORE(ENUT,EL1,DEN1,EPKE,VABS)
    * Additional solver options
SOLUTN(P1,Y,Y,Y,N,N,Y)
SOLUTN(C1,Y,Y,Y,N,N,Y)
SOLUTN(TEM1,Y,Y,Y,N,N,Y)
TURMOD(KECHEN)

*****
  Echo save-block settings for Group 7
  save7begin
(stored of C1PM is 1.E6*C1 with IMAT<100.)
  save7end
*****
  Group 8. Terms & Devices
NEWRH1 = T
NEWENL = T
*****
  Group 9. Properties
PRESS0 =1.01325E+05 ;TEMP0 =273.
    * Domain material index is 2 signifying:
    * Air using Ideal Gas Law, STP
SETPRPS(1, 2)
DRH1DP = GRND5
DVO1DT =3.33E-03
PRNDTL(C1)=0.7 ;PRNDTL(TEM1)=-0.0263
PRT(KE)=0.75 ;PRT(EP)=1.15
*****
  Group 10.Inter-Phase Transfer Processes
*****
  Group 11.Initialise Var/Porosity Fields
FIINIT(P1)=0. ;FIINIT(U1)=5.
FIINIT(C1)=0. ;FIINIT(TEM1)=20.
  No PATCHes used for this Group

INIADD = F
*****
  Group 12. Convection and diffusion adjustments
  No PATCHes used for this Group
*****
  Group 13. Boundary & Special Sources

```

```
PATCH(BUOYANCY, PHASEM, 0, 0, 0, 0, 0, 0, 1, 1)
COVAL(BUOYANCY, U1, FIXFLU, GRND2)
COVAL(BUOYANCY, V1, FIXFLU, GRND2)
COVAL(BUOYANCY, W1, FIXFLU, GRND2)
```

```
BUOYA =0. ; BUOYB =0.
BUOYC =-9.81
BUOYD =1.204938
EGWF = T
```

```
*****
Group 14. Downstream Pressure For PARAB
*****
```

```
Group 15. Terminate Sweeps
LSWEEP = 500
RESFAC =1.0E-04
```

```
*****
Group 16. Terminate Iterations
LITER(P1)=100 ;LITER(C1)=50
LITER(TEM1)=50
*****
```

```
Group 17. Relaxation
RELAX(P1 ,LINRLX,1. )
RELAX(U1 ,FALSDT,5. )
RELAX(V1 ,FALSDT,5. )
RELAX(W1 ,FALSDT,5. )
RELAX(KE ,LINRLX,0.5 )
RELAX(EP ,LINRLX,0.5 )
RELAX(C1 ,LINRLX,0.5 )
RELAX(TEM1,LINRLX,0.5 )
KELIN = 3
```

```
*****
Group 18. Limits
VARMAX(C1)=1. ;VARMIN(C1)=0.
VARMAX(TEM1)=3000. ;VARMIN(TEM1)=-204.75
*****
```

```
Group 19. EARTH Calls To GROUND Station
NAMGRD =FLAR
GENK = T
PARSOL = F
IENUTA = 2
ISG62 = 0
SPEDAT(SET,OUTPUT,NOFIELD,L,T)
SPEDAT(SET,GXMONI,PLOTALL,L,T)
```

```
*****
Group 20. Preliminary Printout
*****
```

```
Group 21. Print-out of Variables
*****
Echo save-block settings for Group 21
save21begin
```

```
integer(npts)
array(xx,real,3)
array(yy,real,3)
array(zz,real,3)
```

```

npts=3

xx(1)= 50.
xx(2)= 60.
xx(3)= 70.

do ii=1,npts
yy(ii)= 50.
zz(ii)=1.75
enddo

do ii=1,npts
(table in output:ii:.csv is
get(VABS{:xx(ii):,:yy(ii):,:zz(ii):},C1{:xx(ii):,:yy(ii):,:zz(ii):})
with head(v:ii:,c:ii:)!sweep)
enddo
  save2lend
  *****
  Group 22. Monitor Print-Out
  IXMON = 49 ;IYMON = 23 ;IZMON = 3
  NPRMON = 100000
  NPRMNT = 1
  TSTSWP = -1
  *****
  Group 23.Field Print-Out & Plot Control
  NPRINT = 100000
  ISWPRF = 1 ;ISWPRL = 100000
  No PATCHes used for this Group
  *****
  Group 24. Dumps For Restarts

GVIEW(P,0.,-1.,0.)
GVIEW(UP,0.,0.,1.)
GVIEW(DEPTH,3.0E+04)
GVIEW(NEARPLANE,0.24)
GVIEW(VDIS,68.330414)
GVIEW(CENTRE,47.293518,50.,2.3)

> DOM,      SIZE,      1.200000E+02, 1.000000E+02, 3.000000E+01
> DOM,      MONIT,     5.081386E+01, 5.000000E+01, 1.875000E+00
> DOM,      SCALE,     1.000000E+00, 1.000000E+00, 1.000000E+00
> DOM,      INCREMENT, 1.000000E-02, 1.000000E-02, 1.000000E-02
> GRID,     RSET_X_1,   20,-1.100000E+00,G
> GRID,     RSET_X_2,   -8, 1.200000E+00,G
> GRID,     RSET_X_3,    3, 1.000000E+00
> GRID,     RSET_X_4,   -8, 1.200000E+00,G
> GRID,     RSET_X_5,   26, 1.100000E+00,G
> GRID,     RSET_Y_1,   16,-1.100000E+00,G
> GRID,     RSET_Y_2,   -5, 1.200000E+00,G
> GRID,     RSET_Y_3,    3, 1.000000E+00
> GRID,     RSET_Y_4,   -5, 1.200000E+00,G
> GRID,     RSET_Y_5,   16, 1.100000E+00,G
> GRID,     RSET_Z_1,    8, 1.000000E+00
> GRID,     RSET_Z_2,   17, 1.100000E+00,G
> DOM,     INI_AMB,     YES
> DOM,     INI_BUOY,    YES

```

```

> OBJ,      NAME,          BUILDING
> OBJ,      POSITION,       3.000000E+01, 4.500000E+01, 0.000000E+00
> OBJ,      SIZE,         1.000000E+01, 1.000000E+01, 6.000000E+00
> OBJ,      GEOMETRY,     cube14
> OBJ,      VISIBLE,      NO
> OBJ,      TYPE,         BLOCKAGE
> OBJ,      WIREFRAME,    YES
> OBJ,      MATERIAL,     198,Solid with smooth-wall friction

> OBJ,      NAME,          INL_GAS
> OBJ,      POSITION,       3.500000E+01, 4.950000E+01, 6.000000E+00
> OBJ,      SIZE,         1.000000E+00, 1.000000E+00, 0.000000E+00
> OBJ,      GEOMETRY,     cube3t
> OBJ,      TYPE,         INLET
> OBJ,      WIREFRAME,    YES
> OBJ,      PRESSURE,     P_AMBIENT
> OBJ,      VELOCITY,     0. ,0. ,1.
> OBJ,      TEMPERATURE,  50.
> OBJ,      INLET_C1,     1.
> OBJ,      TURB-INTENS,  5.
> OBJ,      OBJECT-SIDE,  HIGH

> OBJ,      NAME,          IN_WIND
> OBJ,      POSITION,       0.000000E+00, 0.000000E+00, 0.000000E+00
> OBJ,      SIZE,         TO_END,          TO_END,          TO_END
> OBJ,      DOMCLIP,      NO
> OBJ,      GEOMETRY,     windgr
> OBJ,      ROTATION24,   7
> OBJ,      VISIBLE,      NO
> OBJ,      TYPE,         WIND
> OBJ,      WIREFRAME,    YES
> OBJ,      PRESSURE,     1.01325E+05
> OBJ,      COEFFICIENT,  1000.
> OBJ,      VELOCITY,     2.5
> OBJ,      WIND_DIR,     0.
> OBJ,      AXIS_DIR,     90.
> OBJ,      TEMPERATURE,  20.
> OBJ,      PROFILE,      Logarithmic
> OBJ,      REF_HEIGHT,   10.
> OBJ,      RGHNS_HEIGHT,0.03
> OBJ,      UP-DIR,       Z
> OBJ,      SKY,          YES
> OBJ,      GROUND,       YES
> OBJ,      GROUND-TEMP,  ADIABATIC

```

STOP

</strong></pre></body></html>