```
;;Input deck with properties given by John walton of Nye county
;;Date: 7/2/02
;;Original input deck block_b.in was modified for MULTIFLUX NTCF functionalization.
;;As first step this initial 50x1x1 block is initialized with 20 Degree C initial condition.
;;Step 2: step 1 initial input deck is modified to NTCF module.
;;
;;      COLUMN INFORMATION (x,y =   170500.828,   233807.766)

;;host rock:                          tsw35
;;Dimension (x-y-z):        40x1x1

(usnt
  (title "Nye county, ventilation study, test case1")
  (modelname usnt)

  (include "tmp.inc.time")

  (tolerconv (P 5000.)(S 0.005)(X 0.005)(T 0.5))
  ;; absolute NR conv. tolerance
  (reltolerconv (P 0.005)(S 0.0)(X 0.0)(T 1.e-3))

  (tolerdt (P 2.e4)(S 0.35)(X 0.25)(T 10.))
  (reltolerdt (P 0.1)(S 0.0)(X 0.0)(T 0.0))

  ;; trying with harmonic mean everywhere which means turning off the goemetric before vtough.pkg
  ;;  gets called.
  (diffusion-geo-mean off)
  ;; following has to come after tolerances
  (include-pkg "vtough.pkg")

;;
************************************output*****************************************************
  (output
      (include "tmp.inc.fout")       ;; output the fluxes cross wall
     (include "tmp.inc.res")        ;; output the restart file
  ) ;; end output

;; ***********Physical Properties*************************************************************
   (rocktab
        (f-tsw35
  (cont-len-fac 1.741e-03) (cont-area-fac 1.000e+00)
  (exfac-adv (liquid 1.000e+00) (gas 1.000e+00))
  (solid-density 29.69) (porosity 1.100e-02)
  (Kd        (water 0.0) (air 0.0))
  (KdFactor  (water 0.0) (air 0.0))
  (Cp 9.000E+02)
  (tcond tcondLin (solid 0.01) (liquid 0.01) (gas 0.01))
  (K0 1.290e-16) (K1 1.290e-16) (K2 1.290e-16)
  (tort (gas 7.000e-01) (liquid 0.000e+00))
  (kr (liquid krlVanGen (Sr 1.000e-02) (m 6.110e-01) (Smax 1.0) (gamma 4.100e-01))
      (gas krgModCorey (Srl 1.000e-02) (m 6.110e-01) (Slmax 1.0)))
  (pc (liquid pcVanGen (Sr 1.000e-02) (m 6.110e-01)(alpha 7.390e-04) (Smax 1.0) (gamma 4.100e-
01)))
  (krMC (liquid  krMCactiveFrac (gamma 4.100e-01) (Sr 1.000e-02))
        (gas     krMCactiveFrac (gamma 4.100e-01) (Sr 0.0)))
) ;;End of the material

(m-tsw35
  (cont-len-fac 5.274e-02) (cont-area-fac 9.680e+00)
  (exfac-adv (liquid 1.000e+00) (gas 1.000e+00))
  (solid-density 3.0388e+03) (porosity 1.310e-01)
  (Kd        (water 0.0) (air 0.0))
  (KdFactor  (water 0.0) (air 0.0))
  (Cp 9.000E+02)
  (tcond tcondLin (solid 1.99) (liquid 1.99) (gas 1.99))
  (K0 3.040e-17) (K1 3.040e-17) (K2 3.040e-17)
  (tort (gas 7.000e-01) (liquid 0.000e+00))
  (kr (liquid krlVanGen (Sr 1.200e-01) (m 2.360e-01) (Smax 1.0))
      (gas krgModCorey (Srl 1.200e-01) (m 2.360e-01) (Slmax 1.0)))
  (pc (liquid pcVanGen (Sr 1.200e-01) (m 2.360e-01) (alpha 6.440e-06) (Smax 1.0)))
  (krMC (liquid  krMCintrinsic) (gas  krMCintrinsic))
```

```
) ;;End of the material
(m-dr ;;  equivalent Kth for thermal radiation in the drift
  (cont-len-fac 1.0e-5) (cont-area-fac 1.0)
;; a small value of connected length is used to minimize thermal disequilibrium between the
fracture and matrix continua
  (exfac-adv (liquid 1.000e+00) (gas 1.000e+00))
  (solid-density 5.92500e-01)  (porosity 0.495)
;; porosity =1/2 the single continuum value
;; solid-density=1/2 the single continuum value
  (Kd       (air 0.0) (water 0.0))
  (KdFactor (air 0.0) (water 0.0))
  (Cp 1.006e+03)
  (tcond tcondLin  (solid 0.013) (liquid 0.013) (gas 0.013))   ;;@@@;; Changes
;; tcond = 1/2 the single continuum value
  (K0 0.500e-16) (K1 0.500e-16) (K2 0.500e-16)
;; permeability =1/2 the single continuum value
  (tort (gas 1.000e+00) (liquid 0.0))
  (kr (gas    krgLinear (Smax 1.000e+00)(Sr 0.000e+00))
      (liquid krPower (power 1) (Smax 1.000e+00)(Sr 0.000e+00)))
  (pc (liquid 0.0))
  (krMC (liquid  krMCintrinsic) (gas  krMCintrinsic)))

(f-dr ;;  equivalent Kth for thermal radiation in the drift
  (cont-len-fac 1.0e-5) (cont-area-fac 1.0)
;; a small value of connected length is used to minimize thermal disequilibrium between the
fracture and matrix continua
  (exfac-adv (liquid 1.000e+00) (gas 1.000e+00))
  (solid-density 5.92500e-01)  (porosity 0.495)
;; porosity =1/2 the single continuum value
;; solid density = 1/2 the single continuum value
  (Kd       (air 0.0) (water 0.0))
  (KdFactor (air 0.0) (water 0.0))
  (Cp 1.006e+03)
  (tcond tcondLin  (solid 0.013) (liquid 0.013) (gas 0.013))
;; tcond = 1/2 the single continuum value
  (K0 0.500e-16) (K1 0.500e-16) (K2 0.500e-16)
;; permeability =1/2 the single continuum value
  (tort (gas 1.000e+00) (liquid 0.0))
  (kr (gas    krgLinear (Smax 1.000e+00)(Sr 0.000e+00))
      (liquid krPower (power 1) (Smax 1.000e+00)(Sr 0.000e+00)))
  (pc (liquid 0.0))
  (krMC (liquid  krMCintrinsic) (gas  krMCintrinsic)))
(lsnf(cont-len-fac 1.0e-5) (cont-area-fac 1.0)
;; a small value of connected length is used to minimize thermal disequilibrium between the
fracture and matrix continua
  (exfac-adv (liquid 1.000e+00) (gas 1.000e+00))
  (solid-density 1.5406e+03) (porosity 0.35)
;; because the wp is impermeable, porosity does not affect TH behavior
;; solid-density calculation is on page 31 of Sept. 20
;; because the lsnf properties are applied to both the matrix and fracture continua, which are
each
;; assumed to comprise 50% of the total volume, it is necessary to divide the solid density by
two
;; relative to the calculation on page 31 of Sept. 20
  (Kd       (air 0.0) (water 0.0) )
  (KdFactor (air 0.0) (water 0.0) )
  (Cp 4.88860e+02)
(tcond tcondLin (solid 7.210000)(liquid 7.21000)(gas 7.210000))   ;;@@@;; Changes
;; tcond =1/2 the single continuum value
  (K0 0.000e+00) (K1 0.000e+00) (K2 0.000e+00)
  (tort (gas 1.000e+00) (liquid 0.0))
  (kr (gas    krgLinear (Smax 1.000e+00)(Sr 0.000e+00))
      (liquid krlLinear (Smax 1.000e+00)(Sr 0.000e+00)))
  (pc (liquid  0.0))
  (krMC (liquid  krMCintrinsic) (gas  krMCintrinsic)))

   ) ;; close rocktab
;;
*********************************************************************************************
;; *************Boundary conditions*************************************************************
;;
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```
(bctab
       ( include "tmp.inc.tab" )    ;; Set initial conditions for each
                                    ;; section in drift end b.c.
) ;; end bctab

;; **********************Initial Conditions*****************************************************
     ;; set initial conditions. This block was used for initial restart file
;;      (state
;;             (P by-key  ("*" .88720e05))
;;             (T by-key  ("*" 20.0))
;;             (S.liquid by-key  ("*" 0.001)("*.f*" 0.001))
;;             (X.air by-key ("*" -1.0))
;;      ) ;; end state

;;
**********************Mesh*************************************************************************
;;  This is 3-D initialization mesh for discreet-fracture
;;  This is for 1/2 drift and drift spacing.
  (genmsh
    (anisotropic)
    (down 0. 0. 1.0)
    (coord rect)
    (multi-continua
      (type rocktab)
      (continuum  (name m)
dx 1.0e-5 0.1250 0.2500 0.2500 0.2500 0.2500 0.2500 0.2500 0.2500 0.2500 0.4000 0.4000 0.5000
0.6000
0.7000 0.9000 1.0000 1.2000 1.4000 1.7000 2.0000 2.4000 2.8000 3.3000 4.0000 4.7000 5.6000 6.6000
           7.9000
       )
       (dy 1.0 )
       (dz 1.0 )
       (mat
           (tsw35    m-tsw35   1  nx  1  ny  1  nz)
           (dr1      m-dr      1  1   1  ny  1  nz)
        )
       ) ;; end continuum
       (continuum  (name f)
          (flow-area-density ("*.f*" 1.0))
          (LenFirst  ("*.f*" 1.0))    ;; same as y-direction
                                      ;; half-width of matrix block
          (Len  ("*.f*" 1.0))         ;; same as y-direction
                                      ;; half-width of fracture
                              ;; LenFirst and Len values are doubled here since 50% of cont-len-
fac
                                     ;; is used in rocktab file (Ken Lee)
dx 1.0e-5 0.1250 0.2500 0.2500 0.2500 0.2500 0.2500 0.2500 0.2500 0.2500 0.4000 0.4000 0.5000
0.6000
0.7000 0.9000 1.0000 1.2000 1.4000 1.7000 2.0000 2.4000 2.8000 3.3000 4.0000 4.7000 5.6000 6.6000
               7.9000
           )
           (dy 1.0 )
           (dz 1.0 )
           (mat
           (tsw35    f-tsw35   1  nx  1  ny  1  nz)
           (dr1      f-dr      1  1   1  ny  1  nz)
       )
       ) ;; end continuum
    ) ;; end multi-continua
  );; end genmsh
;; ********************** Solver options ************************************************
     (linear-solver pcg)
        (eisenstat-walker on)
        (pcg-parameters  (precond d4) (north 25) (toler 1.e-5)
                         (itermax 200))
        (ilu-degree 2)  ;; increase to 2 if you get maximum
                        ;; solver iterations exceeded
)  ;; end of model input
;; ******************** Done ***************************************************************
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