

Multiflo Development Testing + Application
Evaluation of Near-Field
Scott Painter July, 1998

CNWRA
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Scientific Notebook 282

Issued to S. L. Painter

Issued on 17-July-1998

Project number 20-1402-562

Near-field environment code
development - MULTIFLO

Development, testing and documentation
of the MULTIFLO code, including the
GEM and METRA modules

Personnel: Scott Painter (SP)
Mohan Seth (consultant)
Peter Lichtner (consultant)

WS 1/20/2010

14 July 98

Working with Peter Lichtner's multifl01.23
last modified June 29. Found possible
problem in input read when using
DCM in 3-D. Problem occurs ^{SP} ~~near~~₁₋₂₀₋₁₀
after calculation of node positions.

Input file causing problem is
in ~spainter/ron/dcm-sm.dat

Mohan Seth does not see this
problem when running with his
version

Problem is an array dimension problem.

Changed ncomx from 4000 to 7000

Now works fine. Code was not

checking for array limits. Need to

redimension some arrays in meta

Stand alone it + his is to be

used Stand alone.

AS 1/20/2010

17-July 98

Added error check to PPROC.f

Act-ally, mehan's modification.

Code now checks for $n_{cann} > n_{cannmx}$
and exists if true. Tested on Run
Green's input data.

Scott Paiman

OK 1/20/2000

222 1/2/2020

20-July-98

Look for evidence of "spiking" where
 grid spacing changes. Peter & Mohan
 claim this ^{spiking in saturation} occurs in METRA-DCM when
 grid spacing changes. Some initial
 tests fail to uncover any evidence, ~~but~~ ^{SP 1-20-10}

These tests provide some initial ^{SP 1-20-10} checks
 on the code. Using 3 different grids
 on same problem & comparing output.

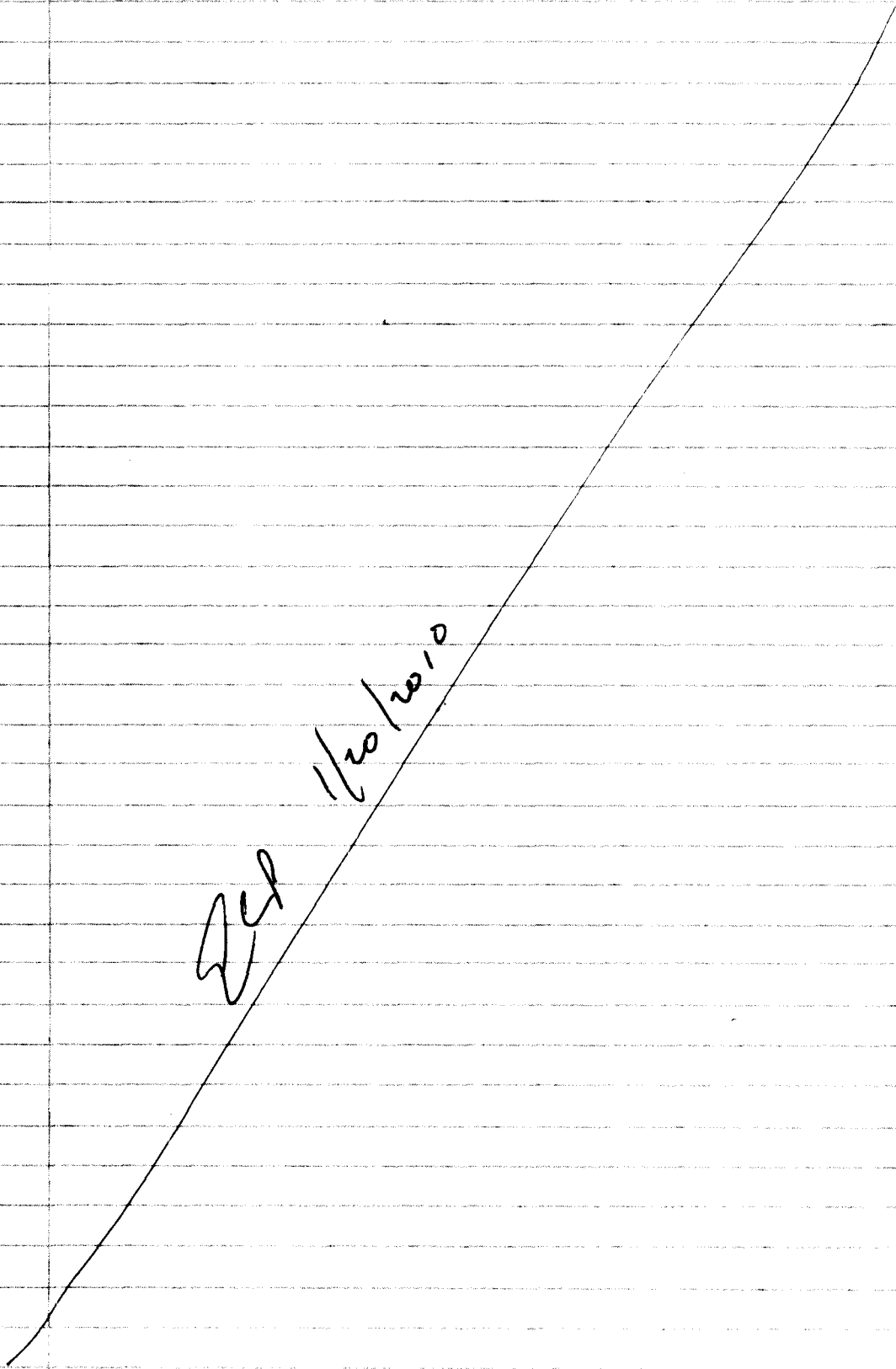
Grid 1 - 550 cells each 1 meter
 2 - 450 1m cells; 50 2 meter cells
 3 - 450 1m cells; 2 50 meter cells

Problem is ^{1-D} repository scale. Bottom of
 domain is water table, top is ground.

Repository horizon at 228 meters depth.

One stratigraphic layer - used TCW11 for
 fracture & matrix parameters. Details in

input files (see below). Ran simulation
 without heat source to steady-state in



order to establish initial conditions.

See the input & output in Skipper

~SPainter/test1/grid1
/grid2
/grid3

for details. No evidence of the
spiking that Peter & Mehan mention.

Output for three cases are indistinguishable
when plotted on same scale. See

Mathematica Notebook on my ^{SP 1-20-10} ~~old~~ PC

D:\MathNB\MetraTest\DCM-unstr1.nb

for the results.

Joan Painter
7-20-98

JP 1/20/2010

Ed
1/20/2010

29-31

Redimensioned an array in mainmtr.f
from 1200000 to 3000000

Also changed maxax similarly

in ~~in~~ SP
1-20-10

SP

ECS

1/20/2010

✓ 11/20/2012

31-July-98

Comparison of metra with steady-state
 Richards eq. ^{SP 1-20-10} ~~See~~ Repository Scale,
 single layer. Set $areamod = 0.0$ to
 decouple matrix & fracture flow.

Details in /skip32/spainter/test2/results.tar

Richards Equation solved in Mathematica

Excellent agreement see

D://MathNB//MetraTest//~~Richards.nb~~
^{SP 1-20-10} Richards.nb

Math. notebook.

with
 However, coupling ($areamod \neq 0$) the
^{SP} ~~with~~ ~~agreement~~ comparison is not so clear.

& Checking into this. In particular, the
 coupling seems to be very strong in METRA.

SP

228 1/20/2010

8-3-98 SP

Found and corrected bug in METRA.

(after discussing with Mohan).

Bug was in PPROC.f when
^{function SP 1.2e-10}
 setting matrix to ~~area~~ ~~total~~ area,

the matrix volume was incorrectly substituted
 for total volume. Code was

$$\text{area}(nc) = \text{areamf}(nc) * vb(mm1-1)$$

changed to

$$\text{area}(nc) = \text{areamf}(nc) * (vb(mm1-1) + vb(mm1)).$$

8-3-98 SP

Redimensioned nbmx from 2000 to 4000
 in parameters.f

Note error message may not be
 completely correct. Error trap works but
 message isn't completely clear.

228 1/20/2010

8-4-98 SP

Identified potentially important conceptual
inconsistency in METRA. The fracture-to-fracture
coupling term uses an area ^{SP} ident^{SP}
calculated as $(\text{area}) \cdot \text{sigmaf}$ where
"area" is the ^{SP} $1.26 \cdot 10^{-10}$ cell face area and
"Sigmaf" is the fracture volume fraction.
This ^{SP} $1.26 \cdot 10^{-10}$ may be inconsistent with
the definition of fracture permeability
that users are inputting. Needs to
be ^{SP} $1.26 \cdot 10^{-10}$ ~~red~~ cleaned up. Probably need
to ^{SP} $1.26 \cdot 10^{-10}$ ~~replace~~ or remove the "sigmaf"
term from the above calculation.

Ed 1/20/2020

8-6-98

Small error corrected in plots. f
 of metro. ^{SP 1-20-10} ~~then~~ Replaced
 the following

if (psatk(m).gt. zero) then
 with

if (one-sgcm).lt.one and. icond.eq. 0. and.
 psatk(m).gt. zero) then

This is in the section below

C - - - - relative humidity plot
 fixes an error in printing rel. humidity
 when fluid is all one phase.
 Change due to Mohan Seth.

Transferred to electronic form
 on 8-6-98

Scott Painter

No further entries in this book.
 ECP 1/20/2010