

```

;-----
;      Excavation in a saturated soil
;-----

config fluid
; --- geometrical model ---
gen zone brick p1 12 0 0 p2 0 12 0 p3 0 0 12 size 12 12 12 rat 1 1 1
group soil
group excavate range x 0 4 y 0 4 z 0 5
group wall      range x 4 5 y 0 5 z 0 7
group wal2      range x 0 4 y 4 5 z 0 7
group wall      range group wall any group wal2 any
; --- fluid flow model ---
model fl_iso
prop perm 1e-12 poro 0.3
ini fdensity 1e3
ini fmod 2.0e9
model fl_null range group excavate
model fl_null range group wall
ini pp 0 grad 0 0 1e4
fix pp range z -0.1 0.1
fix pp range x -0.1 4.1 y -0.1 4.1 z 4.9 5.1
; --- mechanical model ---
model elas
prop bul 3.9e6 shea 2.8e6
model null range group excavate
ini density 1.2e3
ini density 1.5e3 range group wall
fix x range x -.1 .1
fix x range x 11.9 12.1
fix y range y -.1 .1
fix y range y 11.9 12.1
fix z range z 11.9 12.1
; initial total stresses
ini szz 0 grad 0 0 -1.5e4
ini sxx 0 grad 0 0 -1.2e4
ini syy 0 grad 0 0 -1.2e4
apply nstress 0 grad 0 0 -1.2e4 range x 0.0 4.0 y 3.9 4.1 z 0.0 5.0
apply nstress 0 grad 0 0 -1.2e4 range x 3.9 4.1 y 0.0 4.0 z 0.0 5.0
apply nstress      -7.5e4 range x 0.0 4.0 y 0.0 4.0 z 4.9 5.1
; --- setting ---
set gravity 0 0 10
; --- initial state ---
solve force 1 ; check initial equilibrium
; --- histories ---

```

```

set hist_rep 40
hist fltime
hist gp pp 0 0 6
hist gp xdis 4 0 0
hist gp xdis 4 0 2
hist gp xdis 4 2 0
hist gp zdis 0 0 5
hist gp zdis 2 0 5
hist gp zdis 4 0 5
hist gp zdis 2 2 5
hist gp zdis 4 2 5
hist gp zdis 4 4 5
hist gp zdis 10 0 1
hist gp zdis 10 0 2
;
; --- excavation ---
set fluid off
; apply pore pressure at walls
apply nstress 0 grad 0 0 -1.e4 range x 0.0 4.0 y 3.9 4.1 z 0.0 5.0
apply nstress 0 grad 0 0 -1.e4 range x 3.9 4.1 y 0.0 4.0 z 0.0 5.0
apply nstress -5.e4 range x 0.0 4.0 y 0.0 4.0 z 4.9 5.1
solve force 1
save excl.sav
;
; --- drainage ---
fix pp 0 range x -0.1 4.1 y -0.1 4.1 z 4.9 5.1
apply remove nstress
solve force 1
save exc2.sav
;
; --- percolation ---
set fluid on
cyc 9000
save exc3.sav
ret

```