6
Referências bibliográficas

1 BATHE, K. Finite Element Procedures. 1996

2 BILLI, A. Grain size distribution and thickness of breccia and gouge zones from thin (<1m) strike-slip fault cores in limestones. Journal of Structural Geology, v. 29, p. 1823-1837, 2005.

3 CAINE, J. S.; EVANS, J. P.; FORSTER, C. B. Fault zone architecture and permeability structure. Geology, v. 24, n. 11, p. 1025-1028, 1996.

4 CHESTER, F. M.; LOGAN, J. M. Implications for Mechanical Properties of Brittle Faults from Observations of the Punchbowl fault zone, California. PAGEOPH, v. 124, 1986.

5 DASSAULT SYSTÈMES SIMULIA. ABAQUS 6.9-2 – Abaqus Analysis User's Guide. 2009

6 DAVIS, R. O.; SELVADURAI, A. P. S. Plasticity and Geomechanics. 2002.

7 FALCAO, F. O. L.; NOGUEIRA, M. C. D.; LIMA, C. C.; MEURER, G. B.; CLENNELL, B.; DELLE PIANE, C.; GIWELLI, A.; RAIMON, J.; RICHETTI, M.; ESTEBAN, L.; KIEWIET, L. & KAGER, S. Sumário das Entregas associadas ao Marco Crítico de outubro de 2014 do projeto "Reativação de Falhas". PETROBRAS/CENPES. 2014

8 FJAER, E.; HOLT, R. M.; HORSRUD, P.; RAAEN, A. M. & RISNES, R. Petroleum Related Rock Mechanics. 2ª ed. 2008.

9 FRANÇA, C. P. A. 3D Seismic Interpretation and Tectonic History of the Seagap Fault Zone, Offshore Tanzania. 2012. (Mestrado). Department of Earth Science and Engineering, Imperial College London

10 GOODMAN, R. E. Introduction to Rock Mechanics. 2ª ed. 1989.

11 HAUSEGGER, S.; KURZ, W.; RABITSCH, R.; KIECHL, E.; BROSCH, F. Analysis of the internal structure of a carbonate damage zone: implications for the mechanisms of fault breccia formation and fluid flow. Journal of Structural Geology, v. 32, p. 1349-1362, 2010.

12 HILLIS, R. R. Coupled changes in pore pressure and stress in oil fields and sedimentary basins. Petroleum Geoscience, v. 7, p. 419-425, 2001.

13 JAEGER, J. C.; COOK, N. G. W.; ZIMMERMAN, R. W. Fundamentals of rock mechanics. 4 ed. 2007.

14 KIEWIET, M. C. D. N. Comportamento Hidromecânico de zona de Falha em Travertino: Estudo experimental e Numérico sobre o impacto da Reativação estrutural na produção de reservatórios. 2015. 652 (Doutorado). Instituto de Geociências, UFRJ

15 KIEWIET, M. C. D. N.; SOARES, A. C.; FALCAO, F. O. L.; JUNIOR, L. P. B.; LEAL, R. A. F; LIMA, C. C.; MEURER, G. B. Sumário de propriedades hidromecânicas para rochas intactas e rochas de falha em travertinos. PETROBRAS/CENPES. 2016

16 LOGAN, D. L. A first course in the finite element method. 4ª ed. 2007.

17 MOLLI, G.; CORTECCI, G.; VASELLI, L.; OTTRIA, G.; CORTOPASSI, A.; DINELLI, E.; MUSSI, M.; BARBIERI, M. Fault zone structure and fluid-rock interaction of a high angle normal fault in Carrara marble (NW Tuscany, Italy). Journal of Structural Geology, v. 32, p. 1334-1348, 2010.

18 NACHT, P. K.; OLIVEIRA, M. F. F.; ROEHL, D. M.; COSTA, A. M. Investigation of geological fault reactivation and opening. Mecánica computacional, v. XXIX, p. 8687-8697, 2010.

19 NOGUEIRA, M. C. D., FALCAO, F. O. L.; LIMA, C. C.; MEURER, G. B.; GIWELLI, A.; RAIMON, J.; RICHETTI, M.; ESTEBAN, L.; KIEWIET, L. & KAGER, S. Ensaios de Cisalhamento Direto em Amostras de travertino. PETROBRAS/CENPES. 2013

20 NOGUEIRA, M. C. D.; FALCAO, F. O. L.; LIMA, C. C.; CLENNELL, B.; GIWELLI, A.; AHMED, S.; ZHANG, Y.; CLEARY, P.; LEMIALE, V.; PEREIRA, G.; RAIMON, J.; RICHETTI, M.; SAROUT, J.; ESTEBAN, L.; MANEY, B.; KIEWIET, L. & KAGER, S. Sumário das entregas associadas ao marco crítico de junho de 2013 do projeto "Reativação de falhas". PETROBRAS/CENPES. 2013

21 NOGUEIRA, M. C. D.; FALCAO, F. O. L.; LIMA, C. C.; KIEWIET, L.; KAGER, S.; FIRNS, S.; GIWELLI, A.; RAIMON, J.; ESTEBAN, L.; DILLINGER, A.; MANEY, B.; CLENNELL, B.; SOARES, A. C. & BARROSO, E. V. . Caracterização mecânica básica de Amostras de travertino. PETROBRAS/CENPES. 2013

22 NOGUEIRA, M. C. D.; KIEWIET, L. H.; KAGER, S.; FIRNS, S.; GIWELLI, A.; RAIMON, J.; ESTEBAN, L.; DILLINGER, A.; MANEY, B.; CLENNELL, B.; SOARES, A. C. & BARROSO, E. V. Rock mechanics test campaign for the mechanical characterization of travertine rocks from the region of Central Apennines, Italy. PETROBRAS/CSIRO. 2013

23 SEGALL, P. Earthquakes triggered by fluid extraction. Geology, v. 17, p. 942-946, 1989.

24 SIBSON, R. H. Fault rocks and fault mechanisms. Geological society of london journal, v. 133, p. 191-213, 1977.

25 SIBSON, R. H. Crustal stresses, faulting and fluid flow. Geological society, London, Special Publications, v. 78, p. 69-84, 1994.

26 STREIT, J. E.; HILLIS, R. R. Estimating fluid pressures that can induce reservoir failure during hydrocarbon depletion. SPE Rock mechanics Conference. Irving, Texas: Society of petroleum engineers 2002.

27 TWISS, R. J.; MOORES, E. M. Structural Geology. 2ª ed, 2007.

28 WIPRUT, D.; ZOBACK, M. D. Fault reactivation and fluid flow along previously dormant normal fault in the northern north sea. Geology, v. 28, no.7, p. 595-598, 2000.

29 ZIENKIEWICZ, O. C.; TAYLOR, R. L. The finite element method. 5ª ed. 2000.

30 ZOBACK, M. Reservoir Geomechanics. 2007.

APÊNDICE A
Script em Python utilizado para exportar os dados do ABAQUS

```
# import
import math
import odbAccess

print('***** Traixial Test Output Script *****')

# Data input
filename = '1876_CP1_2conf_FINAL_v1'
stepname = 'Carga_desviadora'
radialelmsetname = 'ELEM_CENTRO'
topnodesetname = 'TOPO'
topelmsetname = 'TOPO_ELEM'
D0 = 37.42
L0 = 95.71

# Processing
odbfilename = filename + '.odb'
outfilename = filename + '_' + stepname + '_v4b_out.dat'
odb = session.openOdb(odbfilename)
print('Element sets = ',odb.rootAssembly.instances['PART-1-1'].elementSets.keys())
print('Node sets = ',odb.rootAssembly.instances['PART-1-1'].nodeSets.keys())
outfile = open(outfilename,'w+')
outfile.write("sig_ax[FL^-2], eps_axial[-], eps_radial_el[-]\n")

topelm = odb.rootAssembly.instances['PART-1-1'].elementSets[topelmsetname]
topnode = odb.rootAssembly.instances['PART-1-1'].nodeSets[topnodesetname]
radialelm = odb.rootAssembly.instances['PART-1-1'].elementSets[radialelmsetname]


frames = odb.steps[stepname].frames
numframes = len(frames)
for nframe in range(numframes):
    print('Writing frame %d' % nframe)
    timeframe = odb.steps[stepname].frames[nframe]

    displ = timeframe.fieldOutputs['U']
    stress = timeframe.fieldOutputs['S']
    strain = timeframe.fieldOutputs['E']
    ivol = timeframe.fieldOutputs['IVOL']

    topnode_displ = displ.getSubset(region=topnode)
    topelm_stress = stress.getSubset(region=topelm)
    topelm_ivol = ivol.getSubset(region=topelm)
    radialelm_strain = strain.getSubset(region=radialelm)
    radialelm_ivol = ivol.getSubset(region=radialelm)
```

```
    numtopnodes = len(topnode_displ.values)
    numtopintps = len(topelm_stress.values)
    numradintps = len(radialelm_strain.values)

    sum_dL = 0.
    for v in topnode_displ.values:
        sum_dL = sum_dL + v.data[1] # y-displacement
    dL = sum_dL/numtopnodes
    eps_axial = - dL/L0

    sumvoltop = 0.0
    sumstrtop = 0.0
    for intp in range(numtopintps):
        sumvoltop = sumvoltop + topelm_ivol.values[intp].data
        sumstrtop = sumstrtop + topelm_stress.values[intp].data[1] * topelm_ivol.values[intp].data
    sig_axial = - sumstrtop/sumvoltop

    sumvolrad = 0.0
    sumepsrad = 0.0
    for intp in range(numradintps):
        sumvolrad = sumvolrad + radialelm_ivol.values[intp].data
        er = 0.5*(radialelm_strain.values[intp].data[0] + radialelm_strain.values[intp].data[2])
        sumepsrad = sumepsrad + er * radialelm_ivol.values[intp].data
    eps_rad_el = - sumepsrad/sumvolrad

    outfile.write("%12.5E, %12.5E, %12.5E\n" % (sig_axial, eps_axial, eps_rad_el))
outfile.close()
print('FIM write_triaxialtest_v4_output')
#odb.close()
```