

Abaqus Theory Manual, version 6.10.

API Bulletin 5C3 (1994). **Formulas and calculations for casing, tubing, drill pipe, and line pipe properties**. Sixth edition.

AKGUN, FERDA, SHEDID, SHEDID A., AL-GHADBAN, HAMED H (2004). **Simulation Investigation of Casing Eccentricity Estimation for Different Inclination Angles and Tensile Forces Using Finite Element Method**. Abu Dhabi Petroleum Institute, U.A.E. University, Al-Ain, U.A.E. SPE 91811.

ALDIN, M.H., LOGAN, K., BURREN, C.V., MCGILL, R.M. (1998). **A System for comprehensive measurements of pipe wall thickness and diameter in support of risk-based tubulars design**. SPE Applied Technology Workshop on Risk Based Design of Well Casing and Tubing, Woodlands, Texas, U.S.A. SPE 48333.

ALLEN, EDWARD, AND JOSEPH IANO (2004). **Fundamentals of Building Construction: Materials and Methods**. Hoboken, NJ: J. Wiley & Sons.

BATHE, KLAUS-JURGEN (1982). **Finite Element Procedures in Engineering Analysis**. Englewood Cliffs, NJ: Prentice-Hall.

BERGER, A., FLECKENSTEIN, W.W., EUSTES, A.W., THONHAUSER, G. (2004). **Effect of eccentricity, voids, cement channels, and pore pressure decline on collapse resistance of casing**. SPE Annual Technical Conference and Exhibition, Houston, Texas, U.S.A., 26-29 September 2004. SPE 90045.

BEVINS, VINCENT (Dec. 31, 2011). **Spill makes waves amid Brazil oil boom**. Los Angeles Times. Retrieved on March 19, 2012.

BOURGOYNE JR., A.T., CHENEVERT, M.E., MILLHEIM, K.K., YOUNG JR. F.S. (1991). **Applied Drilling Engineering**. Richardson, Texas, Society of Petroleum Engineers.

BOSMA, M., RAVI, K., VAN DRIEL, W., JAN SCHREPPERS, G. (1999). **Design approach to sealant selection for the life of the well**. SPE Annual Technical Conference and Exhibition, Houston, TX. 3-6 October 1999. SPE 56536.

BOTELHO, FABRÍCIO VIEIRA CUNHA (2008). **Análise Numérica do Comportamento Mecânico do Sal em poços de Petróleo**. Rio de Janeiro, RJ.

CELLA, PAULO ROBERTO COSTA (2003). **Concepção de dispositivo par execução de ensaios triaxiais de fluência em rocha salina sob altas pressões e temperaturas**. Doctoral dissertation. Escola Politécnica da Universidade de São Paulo.

CHANG, H., KOWSMANN, R.O., FIGUEIREDO, A., BENDER, A. (1992). **Tectonics and stratigraphy of the East Brazil Rift system: an overview**. Tectonophysics, Volume 213, Issues 1-2, Geodynamics of Rifting, Volume II Case History Studies on Rifts: North and South America and Africa, pp 97-138.

CHIEF COUNSEL'S REPORT (2011). **Macondo: The gulf oil disaster**. National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling. United States. Chp. 4.3.

CHOU, PEI CHI., PAGANO, NICHOLAS J. (1967). **Elasticity—Tensor, dyadic, and engineering approaches**. D. Van Nostrand Company, Inc., Princeton, New Jersey.

COSTA, A.M., POIATE, E. JR., FALCÃO J.L. & COELHO L. F. M (2005). **Triaxial creep tests in salt applied in drilling through thick salt layers in Campos Basin, Brazil**. IADC/SPE 92629

COSTA, A.M. POIATE JR. E.; AMARAL, C.S. GONÇALVES, C.J.C AND FALCÃO, J.L (2010). **Geomechanics applied to the well design through salt layers in Brazil: A History of Success. ARMA 10-239**

DEEPWATER HORIZON STUDY GROUP (2011). **Final report on the investigation of the macondo well blowout**. Rep. University of California Berkeley: Center for Catastrophic Risk Management.

DESAI, C.S., CHANDRAKANT S. (1979). **Elementary finite element method**. Englewood Cliffs: Prentice-Hall.

DESAI, C. S., AND HEMA J. SIRIWARDANE (1984). **Constitutive Laws for Engineering Materials, with Emphasis on Geologic Materials**. Englewood Cliffs, NJ: Prentice-Hall.

DOWLING, NORMAN E. **Mechanical Behavior of Materials: Engineering Methods for Deformation, Fracture, and Fatigue**. Upper Saddle River, NJ: Prentice Hall, 1999.

FLAC^{3D} Software Manual, version 4.0.

FLECKENSTEIN, W.W., EUSTES, A.W. AND MILLER, M.G. (2000). **Burst Induced Stresses in Cemented Wellbores**. SPE/AAPG Western Regional Meeting, 19-22, Long Beach, California. Technical Report SPE 62596.

FLÜGGE, Wilhelm. (1967). **Viscoelasticity**. Waltham, MA.

FORNEY, MATTHEW (18 October, 2004). **China's quest for oil**. Time Magazine. Retrieved on March 20, 2012.

FOURMAINTRAUX, D., FRANCO, C., FRABOULET, B., BROSSOLLET, P. (2005). **Efficient Wellbore Cement Sheath Design Using the SRC (System Response Curve) Method**. SPE Europe/EAGE Annual Conference, Madrid, Spain. SPE 94176.

FREDRICH. J.T., HICKMAN, R.J., FOSSUM, A.F. (2006). **Mineralogy of deepwater Gulf of Mexico salt formations and implications for constitutive behavior**. Journal of Petroleum Science & Engineering, 57.

FREDRICH, J.T., FOSSUM, A.F. (2007). **Probabilistic analysis of borehole closure for through-salt well design**. Journal Acta Geotechnica, volume 2, number 1, 41-51. Springer Berlin / Heidelberg.

GONNERMAN, H.F AND W., LERCH (1951). **Changes in Characteristics of Portland Cement as Exhibited by Laboratory Tests over the Period 1904 to 1950**. ASTM Special Technical Publication no. 127.

GRAY, K.E, PODNOS, E. BECKER, E. (2009). **Finite-Element Studies of Near-Wellbore Region During Cementing Operations: Part I**. Production and Operations Symposium, Oklahoma City, Oklahoma. SPE 106998.

HAMBLEY, DOUGLAS F. DUSSEAULT, M.B. and DENNIS MRAZ. (1989) **Characterization of salt rock creep behavior**. University of Waterloo, Ontario, Canada.Mraz Consultants.

HIBBELER, R. C. (2003). **Mechanics of Materials**. Upper Saddle River, NJ: Pearson Education.

HYNE, NORMAN J. (2001). **Nontechnical Guide to Petroleum Geology, Exploration, Drilling, and Production**. Tulsa, OK: Penn Well.

INFANTE, E.F. AND M.E. CHEVERT, (1989). **Stability of Boreholes drilled through Salt Formations Displaying Plastic Behavior**. Technical Report SPE 15513.

INTERPIPE®. Oil and gas pipe catalogue.
<http://www.interpipe.biz/en/company.html>

JO, HYUNIL (2008). **Mechanical behavior of concentric and eccentric casing, cement and formation using analytical and numerical methods**. University of Texas at Austin.

LAFARGE WELL CEMENTS (2012). **Specialty cements**.
<http://www.lafarge-na.com/wps/portal/na/en>. Retrieved on September 27th, 2011.

LAMBE, T. WILLIAM., AND ROBERT V. WHITMAN (1979). **Soil Mechanics**, SI Version. New York: Wiley.

MACGREGOR, JAMES G., WIGHT, J. (2005). **Reinforced Concrete: Mechanics and Design, 4th Edition**. Upper Saddle River, New Jersey: Pearson Prentice Hall.

MEDEIROS, FERNANDO ANTONIO S. (1999). **Análise do comportamento de colunas de revestimento frente à movimentação do sal em poços de petróleo**. Master's thesis, PUC-Rio University, Brazil.

MELO, CARINA GABRIELA DE MELO DE (2009). **Avaliação da Influência do NaCl em pastas de cimento Portland para cimentação de poços de petróleo em zonas evaporíticas**. Master's Thesis, Federal University of Rio Grande do Norte, Brazil.

MIRAVETE, ERNESTO GUTIERREZ PhD. (2005). **Classical and computational solid mechanics for materials engineers: "Creep/Viscoplasticity."** Rensselaer Polytechnic Institute (RPI), Troy, New York.

MUNSON, D.E. (1997). **Constitutive Model of Creep in Rock Salt Applied to underground room closure**. Int. J. Rock Mech. Min. Sci. Vol. 34., No. 2, pp. 233-247. Elsevier Science Ltd, Great Britain.

MUNSON, D.E., (1999). **Multimechanism-deformation parameters of domal salts using transient creep parameters**. Technical Report SAND99-2104. Sandia National Laboratories, Albuquerque, New Mexico.

MUNSON, D.E., (2004). **M-D Constitutive model parameters defined for Gulf Coast salt domes and structures**. Proc. 6th No. Amer. Rock Mech. Symp., Paper ARMA/NARMS 04-549 presented at Gulf Rocks, Houston, Texas.

MUNSON, D.E., DAWSON, P.R., (1984). **Salt Constitutive Model using mechanism maps**. Proceedings, 1st Conference on the Mechanical Behavior of Salt, Tech Publications, Clausthal, Germany, pp. 717-737.

MUNSON, D.E., FOSSUM, A.F., SENSENY, P.E., (1989). **Advances in the resolution of discrepancies between predicted and measured in situ WIPP**

room closures. Technical Report SAND88-2948. Sandia National Laboratories, Albuquerque, New Mexico.

MUNSON, D.E., WAWERSIK, W.R., (1991). **Constitutive modeling of salt behavior—state of the technology.** Proc. 7th Int. Cong. Rock Mech. Aachen, Germany, pp.1797-1810. Technical Report SAND99-2104. Sandia National Laboratories, Albuquerque, New Mexico.

NELSON, ERIK. B., GUILLOT, DOMINIQUE, (2006). **Well Cementing.** Schlumberger, 2nd Edition.

NEWMAN, RICHARD J. (20 June, 2005). **The rise of a new power.** U.S. News & World Report, pp. 40. Retrieved on July 9th , 2011.

NIELSEN, M. P. AND L. C. HOANG (2010). **Limit Analysis and Concrete Plasticity.** CRC Press, Boca Raton, Florida.

OMOJUWA, E. E. OKOYE, A. OUSSENI, A ODUNUGA, S. OSISANYA, AND R. AHMED (2010). “**Understanding the Influence of Rock Stresses on Wellbore Inclination in Salt Formation: A Well Planning Approach.**” SPE 136981.

OTTOSEN, N.S. 1986. Viscoelastic-Viscoplastic Formulas for Analysis of Cavities in Rock Salt. Int. J. Rock Mechanics Mining Sciences, and Geomechanics Abstracts, 23(3): 201-212.

PATTILLO, P.D., MOSCHOVIDIS, Z.A., LAL, M. (1995). **An evaluation of concentric casing for nonuniform load applications.** SPE 29232.

PATTILLO, P.D., LAST, N.C. AND W.T. ASBILL (2004). **Effect of Non-uniform Loading on Conventional Casing Collapse Resistance.** SPE-IADC Drilling Conference, Amsterdam, Netherlands, SPE 79871.

PARKER, SYBIL P. (1997). **McGraw-Hill Dictionary of Engineering.** New York: McGraw-Hill.

PEARCE, J. G., RAMBOW, F. H. K., SHROYER, W., HUCKABEE, P., DE JONGH, H., DRIA, D. E., CHILDERS, B. A., HALL, T. S., DOMINIQUE, T.

(2009). **High Resolution, Real Time Casing Strain Imaging for Reservoir and Well Integrity Monitoring: Demonstration of Monitoring Capability in a Field Installation.** SPE 124932.

POIATE, E. JR., A.M. COSTA AND J. L FALCÃO (2006). **Well Design for Drilling Through Thick Evaporite Layers in Santos Basin—Brazil.** Technical Report IADC/SPE 99161.

QUAN, X., BIRNBAUM, N.K, COWLER, M.S., GERBER, B.I., CLEGG, R.A., HAYHURST, C.J. (2003). **Numerical simulation of structural deformation under shock and impact loads using a coupled multi-solver approach.** 5th Asia-Pacific Conference on Shock and Impact Loads on Structures. November 12-14, 2003 Hunan, China.

REDDY, J. N. (1984). **An Introduction to the Finite Element Method.** New York: McGraw-Hill.

ROSENFELD, JOSHUA H. AND JOHN HOOD, (2006). **Play potential in the deepwater Santos Basin.** Offshore Magazine. Penn Well Publishing, Inc.

SALEHABADI, MANOOCHHR, JIN, MIN, YANG, JINHAI, AHMED, REHAN, TOHIDI, BAHMAN (2010). **The Effect of Casing Eccentricity on the Casing Stability Analysis of a Wellbore Drilled in Gas Hydrate Bering Sediments.** SPE Europec/EAGE Annual Conference and Exhibition, Barcelona, Spain. SPE 131236.

SAMUELSON, ROBERT (18 October, 2006). “**An oil habit America cannot break,**”. Washington Post, A21. See also PBS, “Charting the world’s Oil,” <http://www.pbs.org/frontlineworld/stories/colombia/images/map.swf>. Retrieved on March 12th, 2012.

Schlumberger Oilfield Glossary.

<http://oilfieldglossary.com/Display.cfm?Term=cement>

SHAMES, IRVING H., AND FRANCIS A. COZZARELLI (1992). **Elastic and inelastic stress analysis.** State University of New York at Buffalo. Englewood Cliffs, NJ: Prentice-Hall.

SOUZA, BRUNO BOLSANELO DE., BORGES, SERGIO PINTO DE MOURA SOUZA (2011). **Influência dos cloretos de sódio de potássio nas propriedades plásticas e no comportamento mecânico de pastas para cimentação de poços de petróleo.** Federal University of Rio de Janeiro (UFRJ).

SENI, S.J, MULLICAN, W.F., HAMLIN H.S. (1984). **Texas salt domes--aspects affecting disposal of toxic-chemical waste in solution-mined caverns.** Texas Bureau of Economic Geology. http://www.twdb.state.tx.us/rwpg/rpgm_rpts/5541009.pdf.

THE ECONOMIST. (Dec 7th 2010). “**Looking east. The Saudis are hedging their bets**”.

WEISS, MITCH, and JEFF DONN. (2011). **AP IMPACT: Documents show faulty cement jobs long known as industry problem on offshore rigs.** AP and the Gulf Oil Spill. [Http://www.ap.org/oil_spill/BadCement_61010.html](http://www.ap.org/oil_spill/BadCement_61010.html). Associated Press. Web.

WILLSON, S.M., A.F. FOSSUM AND J.T. FREDRICH, (2003). **Assessment of Salt Loading on Well Casings.** Technical Report SPE 81820. Sandia National Laboratories, Albuquerque, New Mexico.

YANG, CHUNHE, DAEMEN, J.J.K., YIN, JIAN-HUA (1999). **Experimental investigation of creep behavior of salt rock.** International Journal of Rock Mechanics and Mining Sciences 36, pp 233-242.

YANG, CHUNHE (2000). **Time-dependent behavior of Rock salt--Experimental Investigation and Theoretical Analysis.** Doctoral dissertation. University of Nevada, Reno.

9 Index

- Abaqus, 7, 8, 21, 74, 75, 82, 94, 105
 Abstract, 8
 Acknowledgements, 5
annular spacing, 115
 Boundary Conditions, 96
 Cement
 Class G, 65, 85
Constitutive law, 74, 75, 76
 creep, 29
 Creep, 18, 31, 33, 34, 35, 37, 38, 39, 44, 50
 steady state, 34, 38, 44, 50
 tertiary creep, 35, 52
 Transient creep, 34, 35
 deviatoric stress, 25, 35, 37, 43, 44, 48
 double mechanism, 94
 Double mechanism, 50
Eccentricity, 62, 63
 Elasticity, 17, 31
 Finite element analysis method, 75
 First-order elements, 82
 Hencky-von Mises, 56, 59, 60
 hydrostatic stress, 35
 isoparametric elements, 82, 94
 quadrilaterals, 82
 Kirsch solution, 86
 List of Figures, 12
 List of Tables, 16
 Mohr-Coulomb, 53, 105
 Nonuniform loading. *See* 62
 Octahedral shear stress, 134
 ovalization, 21, 22, 64, 65, 75, 85, 98, 102, 103, 107, 112, 115, 119, 123, 124
plane strain, 84, 85, 93
 plane strain theory, 84
 plane stress, 96
 potential creep law, 44
 power creep law, 44
 principal stress. *See* 62
 Rheological models, 39
 Rheological Models
 dashpots, 39, 40
 springs, 40
Rheology, 39
 second-order elements, 83
 Strain, 17, 31, 37, 50, 84
 subroutine, 95
 Table of Contents, 9
 tachyhydrite, 23, 28, 29, 74, 85, 94, 95, 98, 108, 125
 van Sambeek model, 90
 van Sambeek viscoelastic solution, 90
 Viscoelasticity, 32
 viscoplasticity, 32
workhardening, 34, 38