( // , 11 ) , 11 FLAC<sup>3D</sup> ) ( ) .[ ]

Email: mmoosavi@ut.ac.ir , - : : :

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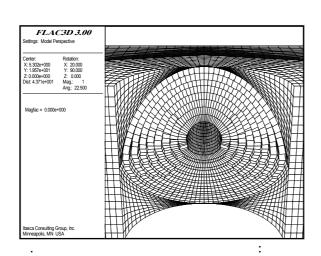
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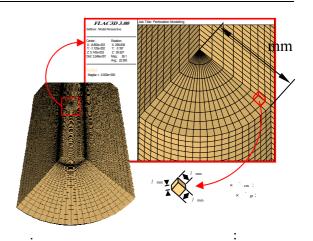
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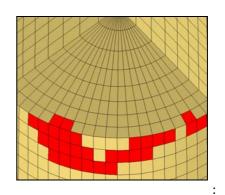
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c <sub>b</sub> GPa	G GPa	E GPa	K <sub>b</sub> GPa	v -	UCS MPa	σ <sub>t</sub> MPa	ρ <sub>b</sub>	k mD	φ	(m)		
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FLAC<sup>3D</sup>

Perforation No. 1 — Perforation No. 1 — Both

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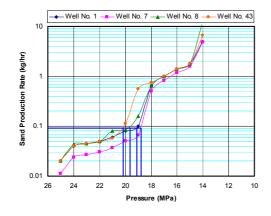
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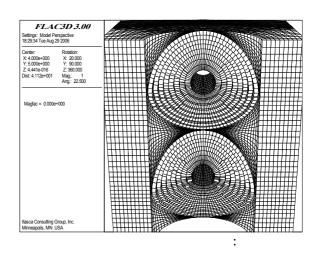
0.01

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Pressure (MPa)

0.001 26 24 22





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1 - Jaeger, J. C. and Cook, N. G. W. (1979). Fundamentals of Rock Mechanics. Third Edition, Chapman & Hill.

- 2 Bratli, R. K. (1979). "Stability and failure of sand arches." *SPE 54<sup>th</sup> Annual Technical Conference and Exhibition*, Las Vegas, Sep. 23-26.
- 3 Hall, C. D. and Harrisberger, W. H. (1969). "Stability of sand arches: A key to sand control." *SPE Fourth Conference on Drilling and Rock Mechanics*, Austin, Texas, Jan. 14-15.
- 4 Veeken, C. A. M., Davies, D. R., Kenter, C. J. and KooijmanT A.P. (1991). "Sand production prediction review: developing an integrated approach." 66<sup>th</sup> Annual Technical Conference and Exhibition of the Society of Petroleum Engineers, Dallas, TX, October 6-9.
- 5 Tixier M. P., Loveless G. W. and Anderson R. A. (1973). "Estimation of formation strength from the mechanicals-properties log." *SPE-AIME 48th Annual Fall Meeting,* Las Vegas, Nevada, September 28 October 3.
- 6 Stein, N. and Hilchie, D. W. (1971). "Estimating the maximum production rate possible from friable sandstones without using sand control." SPE 46<sup>th</sup> Annual Fall Meeting, New Orleans, Oct. 3-6.
- 7 Stein, N., Odeh, A. S. and Jones, L. G. (1973). "Estimating maximum sand-free production rates from friable sands for different well completion geometries." *SPE-AIME 48<sup>th</sup> Annual Fall Meeting*, Las Vegas, Nevada, Sep. 30 Oct 3.
- 8 Perkins, T. K. and Weingarten, T. J. S. (1988). "Stability and failure of spherical cavities in unconsolidated sand and weakly donsolidated rock." 63<sup>rd</sup> Annual Technical Conference and Exhibition of the Society of Petroleum Engineers, Houston, TX, Oct. 2-5.
- 9 Tippie, D. B. and Kohlhaas, C. A. (1973). "Effect of flow rate on stability of unconsolidated producing sands." 48<sup>th</sup> Annual Fall Meeting of the Society of Petroleum Engineers of AIME, Las Vegas, Nevada, Sep. 30 Oct. 3.
- 10 Tronvoll, J., Morita, N. and Santarelli, F. J. (1992). "Perforation cavity stability: comprehensive laboratory experiments and numerical analysis." *67<sup>th</sup> Annual Technical Conference and Exhibition of the society of petroleum Engineers*, Washington, DC, October 4-7.

- 11 Tronvoll, J., Papamichos, E., Skjærstein, A. and Sanfilippo, F. (1997). "Sand production in ultra-weak sandstones: is sand control absolutely necessary." *Fifth Latin American and Caribbean Petroleum Engineering Conference and Exhibition*, Rio de Janeiro, Brazil, August 30 September 3.
- 12 Tronvoll, J., SØnstebØ, E. F. (1997). "Productivity effects of drawdown and depletion in open hole completions: do screens plug." *SPE European Formation Damage Conference*, Hague, the Netherlands, June 2-3.
- 13 Morita, N., Whitfill, D. L., Massle, I. and Knudsen, T. W. (1987). "Realistic sand-production prediction: numerical approach." *SPE Annual Technical conference and Exhibition*, Sep. 27-30.
- 14 Nouri, A., Vaziri, H., Belhaj, H. and Islam, R. (2003). "A comprehensive approach to modeling sanding during oil production." SPE Latin American and SPE Latin American and Caribbean Petroleum Engineering Conference, Port-of-Spain, Trinidad, West Indies, April 27-30.
- 15 Nouri, A., Vaziri, H., Belhaj, H. and Islam, R. (2003). "Effect of volumetric failure on sand production in oil-wellbores." SPE Asia Pacific Oil and Gas Conference and Exhibition, Jakarta, Indonesia, April 15-17.
- 16 Nouri, A., Vaziri, H., Belhaj, H. and Islam, R. (2004). "Sand production prediction: a new set of criteria for modeling based on large-scale transient experiments and numerical investigation." SPE Annual Technical Conference and Exhibition, Houston, Texas, U.S.A., September 26-29.
- 17 Papamichos, E. and Malmanger, E. M. (1999). "A sand-erosion model for volumetric sand predictions in a north sea reservoir." SPE Latin American and Caribbean Petroleum Engineering Conference, Caracas, April 21-23.
- 18 Papamichos, E. and Malmanger, E. M. (1999). "A sand erosion model for volumetric sand predictions in a north sea reservoir." SPE Latin American and Caribbean Petroleum Engineering Conference, Caracas, Venezuela, April 21-23.
- 19 Wan, R. G. and Wang, J. (2002). "Modeling sand production and erosion growth under combined axial and radial flow." SPE International Thermal Operations and Heavy Oil Symposium and International Horizontal Well Technology Conference, Calgary, Alberta, Canada, November 4-7.
- 20 Wang, Y. (1997). "Sand production and foamy oil flow in heavy-oil reservoirs." *SPE International Thermal Operations & Heavy Oil Symposium*, Bakersfield, CA, February 10-12.
- 21 Wang, Y. and Chen, C. C. (1999). "Improved production and sand (cold) production in conventional and heavy oil reservoirs-a field case and simulation." *SPE Asia Pacific Improved Oil Recovery Conference*, Kuala Lumpur, Malaysia, October 25-26.
- 22 Wang, Y. and Chen, C. C. (1999). "Enhanced oil production owing to sand flow in conventional and heavyoil reservoirs." *SPE Asia Pacific Improved Oil Recovery Conference*, Kuala Lumpur, October 25-26.
- 23 Wang, Y., Chen, C. and Dusseault, M. B. (2001). "An integrated reservoir model for sand production and oil flow during cold heavy oil production." *SPE International Thermal Operations and Heavy Oil Symposium*. Margarita, Venezuela, March 12-14.
- 24 Wang, Z., Peden, J. M. and Damasena, E. S. H. (1991). "The predication of operating conditions to constrain sand production from a gas well." *Production Operations Symposium*, Oklahoma, April 7-9.
- 25 Wang, Y. and Xue, S. (2002). "Coupled reservoir-geomechanics model whit sand erosion for sand rate and enhanced production prediction." SPE Internatinal Symposium and Exhibition on Formation Damage Control, Lafayette, Louisiana, February 20-21.

.....

- 26 PEDEC (Petroleum Engineering and Development Company), (2004). Geology Report of Mansuri Field.
- 27 PEDEC (Petroleum Engineering and Development Company), (2004). *LFDT log Evaluation Report of Mansuri Field (Well No. 60)*, Version A.
- 28 PEDEC (Petroleum Engineering and Development Company), (2004). *Mansuri Petrophysical Interpretation*, Version B.
- 29 PEDEC (Petroleum Engineering and Development Company), (2004). Field Pressure Analysis Report of Mansuri Field, Version B.
- 30 PEDEC (Petroleum Engineering and Development Company), (2004). PVT Report of Mansuri Field.
- 31 PEDEC (Petroleum Engineering and Development Company), (2004). Rock Mechanics Tests Report.
- 32 PEDEC (Petroleum Engineering and Development Company), (2004). *Mansuri Sand Control Report*, Version A.
- 33 PEDEC (Petroleum Engineering and Development Company), (2004). *Mansuri Executive Well History Report*, Version B.
- 1 Perforating
- 2 Sand Production Prediction
- 3 Perforation
- 4 Transient Sand Production
- 5 Continuous Sand Production
- 6 Catastrophic Sand Production
- 7 Low Frequency Dipole Tool
- 8 Bottom Hole Pressure (B.H.P.)