Horizontal Drilling Cost Reduction; Case Study

Saber Kh. Elmabrouk and Walid Mohamed Mahmud
Petroleum Engineering Department, Faculty of Engineering
University of Tripoli
Tripoli, Libya
saber_elmabrouk@yahoo.com, W.Mahmud@uot.edu.ly

Abstract

Horizontal drilling has recently been proven to be technically and economically feasible in broad range of geological settings. A horizontal well typically starts by drilling vertically in order to examine rock fragments at different layers so that possible hydrocarbon accumulations can be determined. The tangent section of the well is drilled along a deviated well path to just above the reservoir section to what is known as kick off point. From this point, the well is drilled at an increasingly higher angle arcing around toward an angle close to horizontal. The point at which the well enters the reservoir is called the entry point. The well then is continuously drilled at near-horizontal orientation with the intention of keeping it substantially within the reservoir target until the desired length of horizontal penetration is reached. This study aims to determine the optimum well path parameters in order to reduce drilling costs and risks of drilling wells deviated from their targets. There are several techniques used for computing directional survey including tangential, balanced tangential, average angle, curvature radius, and minimum curvature. Three case studies were conducted to assess and compare these techniques. Minimum curvature technique yielded more accurate results than other techniques.

Keywords
Well Trajectory, Well Survey, Well Path Parameters, Horizontal Drilling, Horizontal Wells

Biography

Saber Kh. Elmabrouk received the Ph.D. degree in Petroleum Engineering from the prestigious University of Regina, Canada. Prior to his Ph.D. he had earned his Master and Bachelor degree in Petroleum Engineering from University of Tripoli, Libya. Dr. Saber is currently a member of Petroleum Engineering Department faculty at the University of Tripoli, Libya. Also, he is adjunct faculty at the Engineering Project Management Department, School of Applied Science and Engineering, The Libyan Academy, Tripoli, Libya. His research interests include reservoir management, phase behaviour, artificial intelligence techniques, modeling, optimization, and uncertainty and risk management.

Walid Mohamed Mahmud received his B.Sc. degree in Petroleum Engineering from the University of Tripoli, Libya in 1995, M.E. and Ph.D. degrees in Petroleum Engineering from the University of New South Wales, Sydney, Australia in 1997 and 2004, respectively and an MBA from the University of Southern Queensland, Toowoomba, Australia in 2007. He is currently an Assistant Professor at the University of Tripoli, Libya. He has industry experience as a Business Development Manager and Senior Reservoir engineer at Heinemann Oil GmbH in Austria and Libya. He also gained teaching experience as a lecturer and assistant professor at the Department of Petroleum Engineering, the University of Tripoli. His main general teaching and research interests are fluid flow in porous media, network modeling, two and three-phase relative permeability and reservoir characterization and management. His current research interests include two and three-phase flow, two and three phase relative permeability and numerical network models.