

OCTOBER 11th 2004

**Eni E&P Division
V° Palazzo Uffici
CONFERENCE ROOM
Via Emilia, 1
San DONATO MILANESE**

10:30 AM

State of Reservoir Simulation Technology and Future Challenges

KHALID AZIZ

Stanford University



Society of Petroleum Engineers

Italian Section

ABSTRACT

Reservoir simulation technology has slowly evolved over the past 40 years or so into an essential tool for reservoir development and management. As computers have become faster and cheaper with larger and larger RAM, simulation engineers have expanded the capabilities of software for modeling reservoir performance. Starting with the early simulators that could only model reservoirs with a few large blocks, we are now able to handle multimillion cell problems. Furthermore, complex recovery processes involving injection of various gases and liquids can be modeled by the compositional approach. Key developments in the thermodynamic description of fluids, modeling of flow in heterogeneous porous media, and the solution of large, highly nonlinear systems of equations have broadened the ability of simulators to handle difficult problems. Furthermore, engineers have learned to understand and incorporate realistic geology in their models. More recently, it has become possible to accurately model advanced wells and surface facilities, thus making it possible to optimize the entire system. The simulator is no longer used with a simple single description of the reservoir, but with multiple, equally probable realizations to allow risk assessment. This lecture will examine some of the important developments of the past 40 years before speculating on the challenges for the future: What are the features that will be needed in the next generation of simulators? How is this technology going to be used in the future?.

BIOGRAPHY

Khalid Aziz is the Otto N. Miller Professor of Earth Sciences and Professor of Petroleum Engineering at Stanford University. Before coming to Stanford in 1982, he was a professor of chemical and petroleum engineering at the University of Calgary. While in Calgary, he established the Computer Modeling Group and managed it for 5 years. He has also served on the faculty of the University of Alberta and as the Chief Engineer of Karachi Gas Co. Ltd. At Stanford, Aziz has served as the Associate Dean for Research (School of Earth Sciences) and as Chair of the Petroleum Engineering Department. His research interests include reservoir simulation, modeling of advanced wells, multiphase flow in pipes, and natural gas engineering. Aziz studied engineering at the University of Michigan (BSE), University of Alberta (BSc and MSc), and at Rice U. (PhD). He has received several national and international awards, including the highest award (Honorary Membership) of the Society of Petroleum Engineers. His publications include more than 150 technical papers, two books (one on Reservoir Simulation) and one monograph. He is a frequent consultant to major oil and gas companies and government agencies throughout the world. He is a member of the National Academy of Engineering of the United States of America and the European Academy of Sciences.