

**SOCIETY OF PETROLEUM ENGINEERS**  
**2011-2012 DISTINGUISHED LECTURES PROGRAM**

**DRILLING AND COMPLETION ACTIVITIES RELATED TO ROCK**

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Approximately at the beginning of the 1980s, rock mechanics was restricted to a few subjects in petroleum industries, such as hydraulic fracture, bit performance and sanding prediction. Nowadays, rock mechanics continues as an auxiliary branch of petroleum industry, but it is present in geology, drilling, completion and reservoir management.

During this period, geologists and engineers have realized that the in situ stresses and its modification, due to drilling/completion and production operations, could have a strong impact on well drilling and producing. On the other hand, they also realized that the determination of rock deformability and strength is a challenging issue. Therefore several methods were developed, and others were improved, in order to measure these properties.

Nowadays, many activities are withstood by rock mechanics, such as wellbore stability, surface subsidence and reservoir compaction. Damage to casings and screens due to underneath formation movement caused by reservoir fluid withdraw and fault activation connecting isolated layers or causing oil/gas to reach the surface or mudline can lead to serious environmental problems.

Rock mechanics deals with structural problems; therefore, one need to know the original stress state, rock properties, geometry (layers and discontinuities) and boundary conditions. More recently, this set of parameters has been named Mechanical Earth Model (MEM). A key to building an MEM is multidisciplinary teams. These teams should be formed by geologists, geophysists and engineers and must be trained in order to diminish the uncertainties of the final MEM.

This lecture will present the state of art of field and lab tests to determine stress and rock mechanics parameters, and also simulations involving drilling and completion problems related to rock mechanics.

**LECTURER CV**

F. H. Ferreira has been working for Petrobras since 1985, currently as a Petrobras Rock Mechanics Lab supervisor. During this time, he has supervised offshore workover activities. Since 1988, Ferreira has worked at Petrobras' Research Center in Rio de Janeiro, Brazil, and has been involved in wellbore stability, hydraulic fracture design, sanding prediction, in-situ stress determination and rock parameters determination. Ferreira holds an MS degree at Pontifical Catholic University of Rio de Janeiro, Brazil, and he is attending to a PhD course of Federal University of Rio de Janeiro, Brazil.