

## **Use and Misuse of Applied Rock Mechanics in Petroleum Engineering**

**Dr. Hazim Abass  
Saudi Aramco**

### **Abstract:**

Rock mechanics deals with rock deformation resulting from applied stress under elastic, plastic, and failure conditions. It has been applied to solve many petroleum engineering problems related to drilling, completion, and production.

This presentation provides insight on the use and misuse of applied rock mechanics in wellbore stability, perforations' stability, hydraulic fracture initiation and propagation, near-wellbore fracture geometry, fracture closure, proppant flow back, and sand production. Examples from these areas will be presented to show how rock mechanics has been used and misused in the process of modeling, testing, and data analysis. The presentation covers the following: 1) estimation of in-situ stresses from lab measurements, 2) application of static and dynamic elastic properties, 3) testing curable resin coated proppant as a mean for proppant flowback control, 4) coupling mechanical and chemical effects to evaluate shale stability, 5) Implication of stress-dependant permeability of the various components of porous media, 6) Oriented perforation to fracture openhole horizontal wells, and 7) deciding on the use of acid or proppant fracturing in carbonate formation.

One idea for the members to take away from this lecture?

Two tests: 1) To answer the question "how many hours I should keep my well closed following a hydraulic fracturing treatment with the use of curable resin coated proppant?", 2) To answer the question "Should I use acid fracturing or proppant fracturing in my carbonate formation?"

### **Biography:**

Dr. Abass is a Petroleum Engineering Consultant at the Advanced Research Center of Saudi Aramco. He holds B.Sc. in Pet. Eng. from the U. of Baghdad, and MS & PhD in Pet. Eng. from the Colorado School of Mines. Before joining Saudi Aramco in 2001, he worked at the Halliburton Research Center in Duncan, Oklahoma, USA and at the Research Center of PDVSA in Los Teques, Venezuela. His research interest is applied rock mechanics in petroleum engineering. He holds 9 patents, more than 40 technical papers, and contributed to 3 industrial books. He is the recipient of several awards; for the SPE he was awarded the 2004 and 2007 Outstanding Technical Editor Awards, the 2008 Middle East Production and Operations Award, and the 2009 SPE International Award- Distinguished Member.