CRISMAN INSTITUTE FOR PETROLEUM RESEARCH

PROJECT: 4.02.16

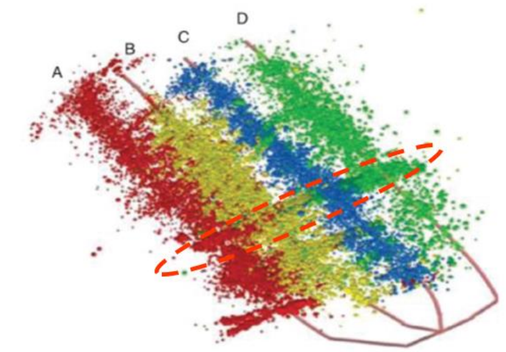
BERG-HUGHES CENTER

Simulation of Production Interference in Multi-Well Pads

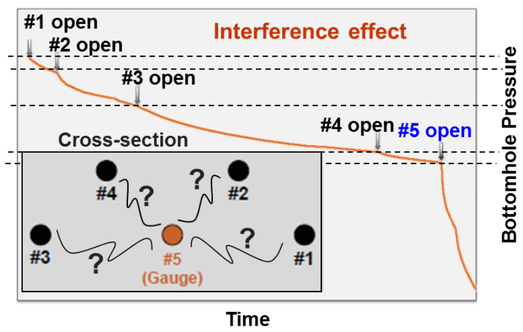
Research Associate: Wei Yu
PI: Ruud Weijermars

OBJECTIVE

Problem:
Well interference =Suboptimum SRV
Evidence Well-interference:
- Pressure data well shut-ins
- Microseismic events



Microseismic events in Eagle Ford shale
(SPE 174946)



Pressure response of #5 Well
in Wolfcamp shale (URTeC: 2154675)

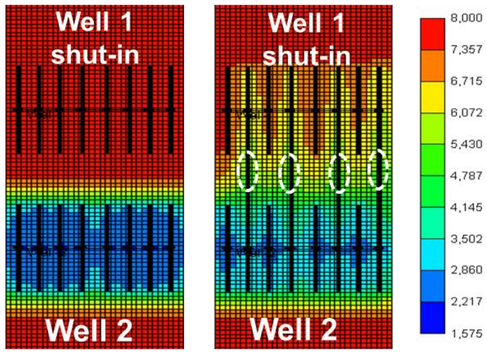
Research Focus:
1. Combine analytical, semi-analytical, and numerical models to identify, analyze, and visualize the inter-well interference
2. Understand the mechanism and intensity of well interference
3. Quantify the optimal well spacing

The 2016 Symposium of Predictive Models for Shale Oil & Gas Reservoirs in Texas, October 10th, 2016, Annenberg Presidential Conference Center, TAMU, College Station, TX

APPROACH

Model Integration
= Physics-based Decline Curves

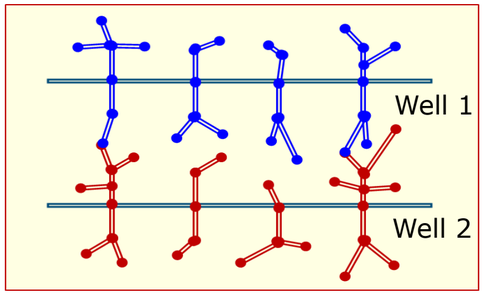
(A) Numerical model



Case 1 Case 2
Pressure profile after 75 days (Fc~50 md-ft)

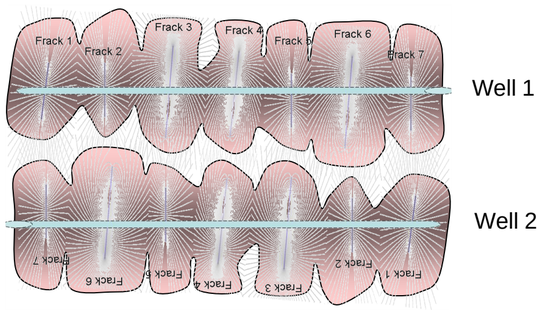
Case 1: No inter-well communication
Case 2: Inter-well communication

(B) Semi-Analytical model



Discretize complex fractures into
a number of small segments
(SPE 178747, Wei Yu 2015)

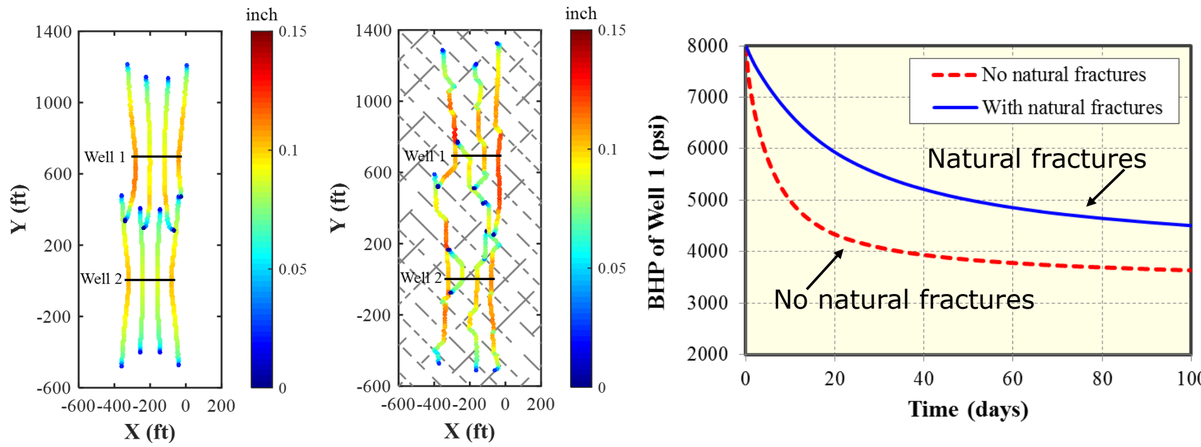
(C) Analytical model



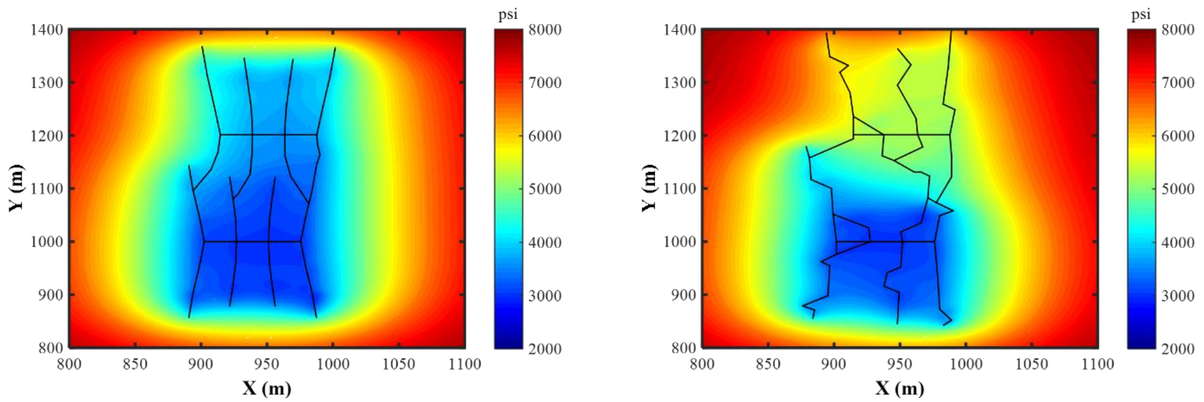
Visualization SRV (interference)

ACHIEVEMENTS

Three Basic Interference Mechanisms
(a) Through matrix permeability
(b) Through simple hydraulic fractures
(c) Through complex fracture network (natural + hydraulic fractures)



Effect of fracture hits on pressure change of shut-in Well 1
with and without natural fractures



SIGNIFICANCE

Anticipated Outcomes and Deliverables
1. Develop diagnostics for recognizing the dominant physical mechanism of well interference for a particular study area
2. Visualization of stimulated rock volume and well interference
3. Apply the proposed methodology to wells from the Eagle Ford and Permian Basin (Shut-in well tests & permeability & fracture data needed)
4. Provide reservoir model tools to operators for determining the optimum well spacing