Research Summary

Drainage Area and Well Interference

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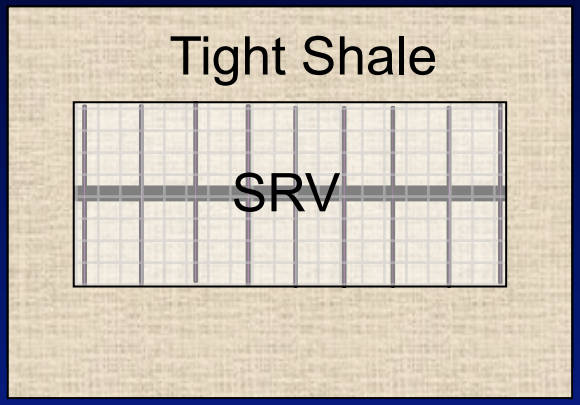
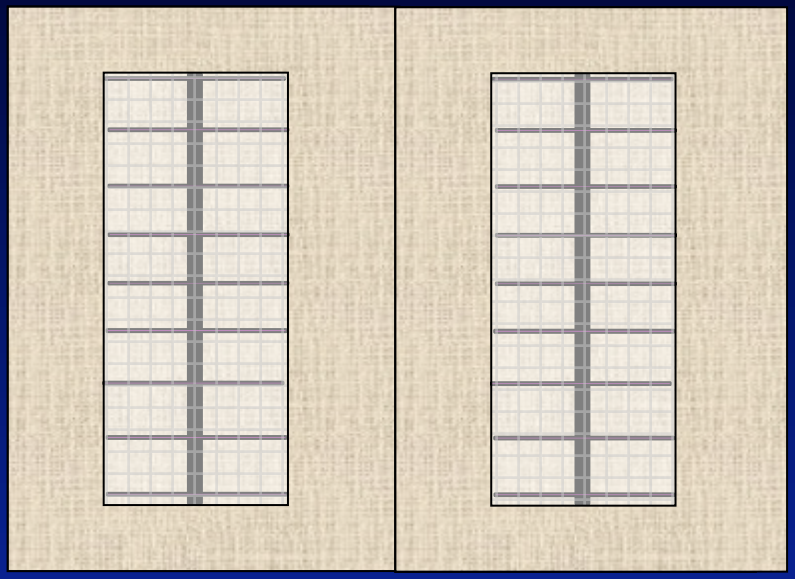
Problem Statement

Drainage area of horizontal wells in shale-gas plays is still an unresolved problem





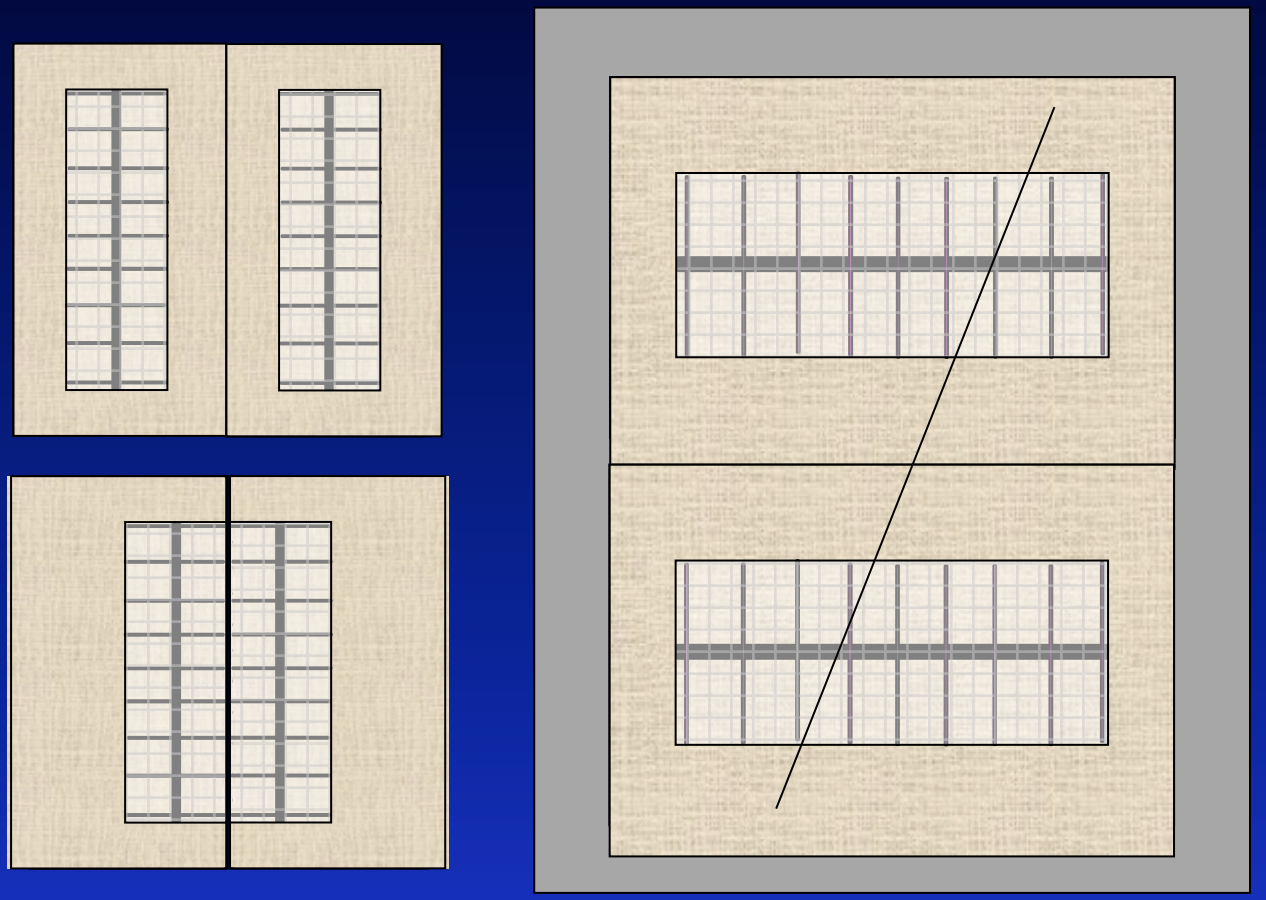
It is usually assumed that there is a strong correlation between the SRV and the drainage area

This perception assumes negligible flow beyond SRV

Interference between two wells is expected to follow the standard lines

Problem Statement

Interference problem becomes complicated when the two wells are connected by discrete fractures

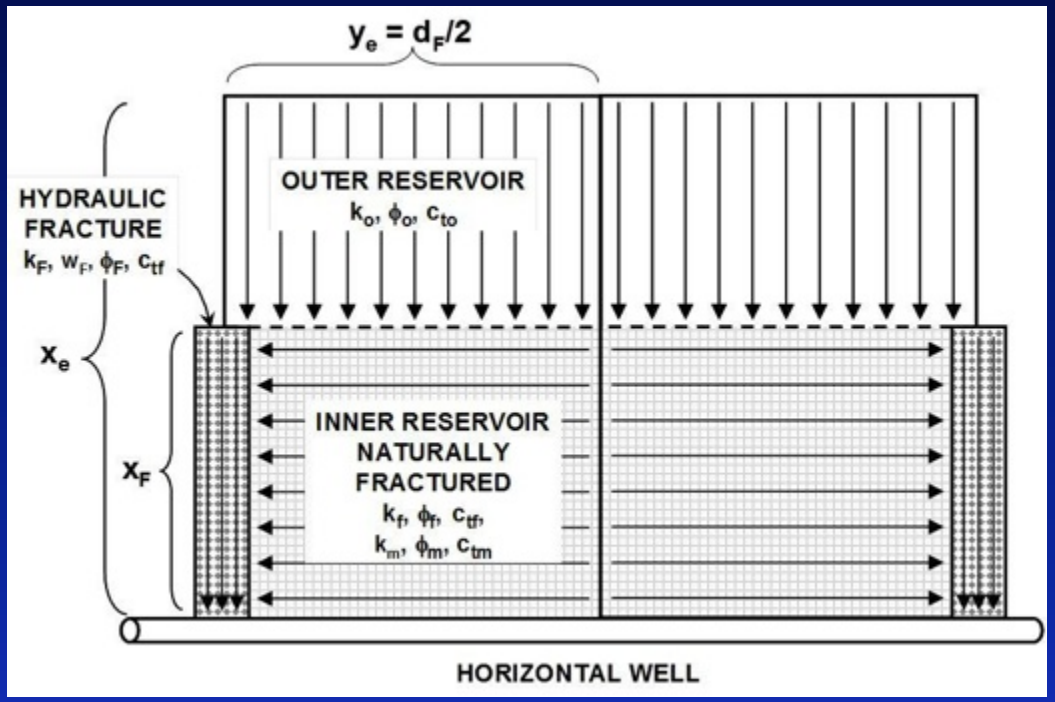


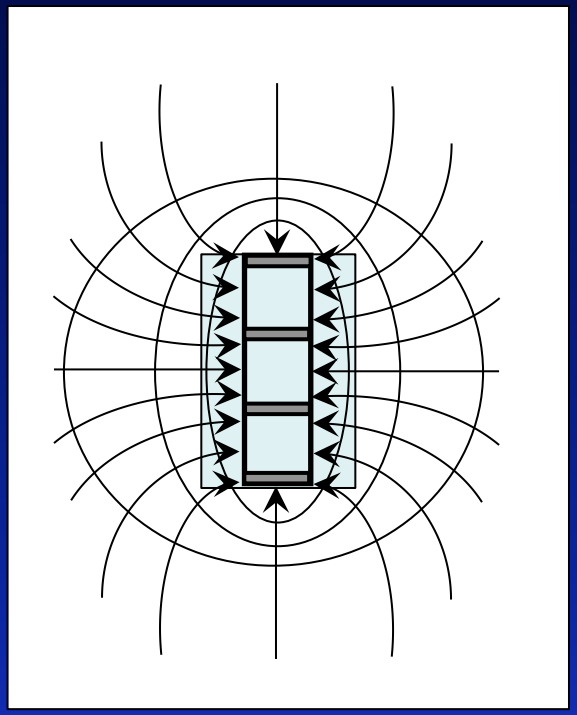
Comparison of interference for production and injection is complicated

It is not clear what an Interference or tracer test would indicate

Problem Statement

Models limiting flow to SRV or linear flow beyond SRV may not be adequate to investigate interference effect



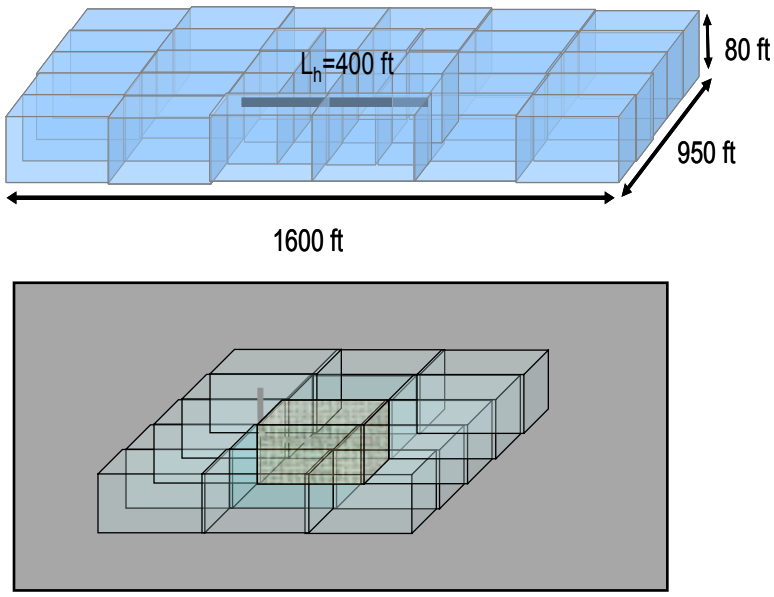


Previous Research

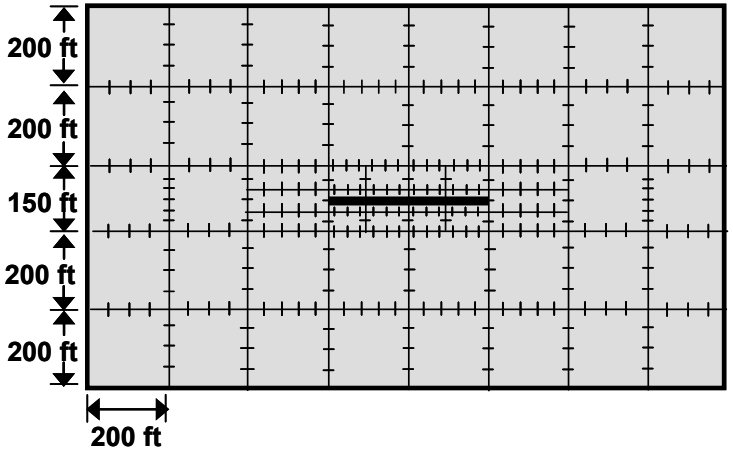
Semi-analytical model capable of handling SRV around wells

Medeiros, Ozkan, Kazemi, SPEREE 2008

Semi-analytical simulation

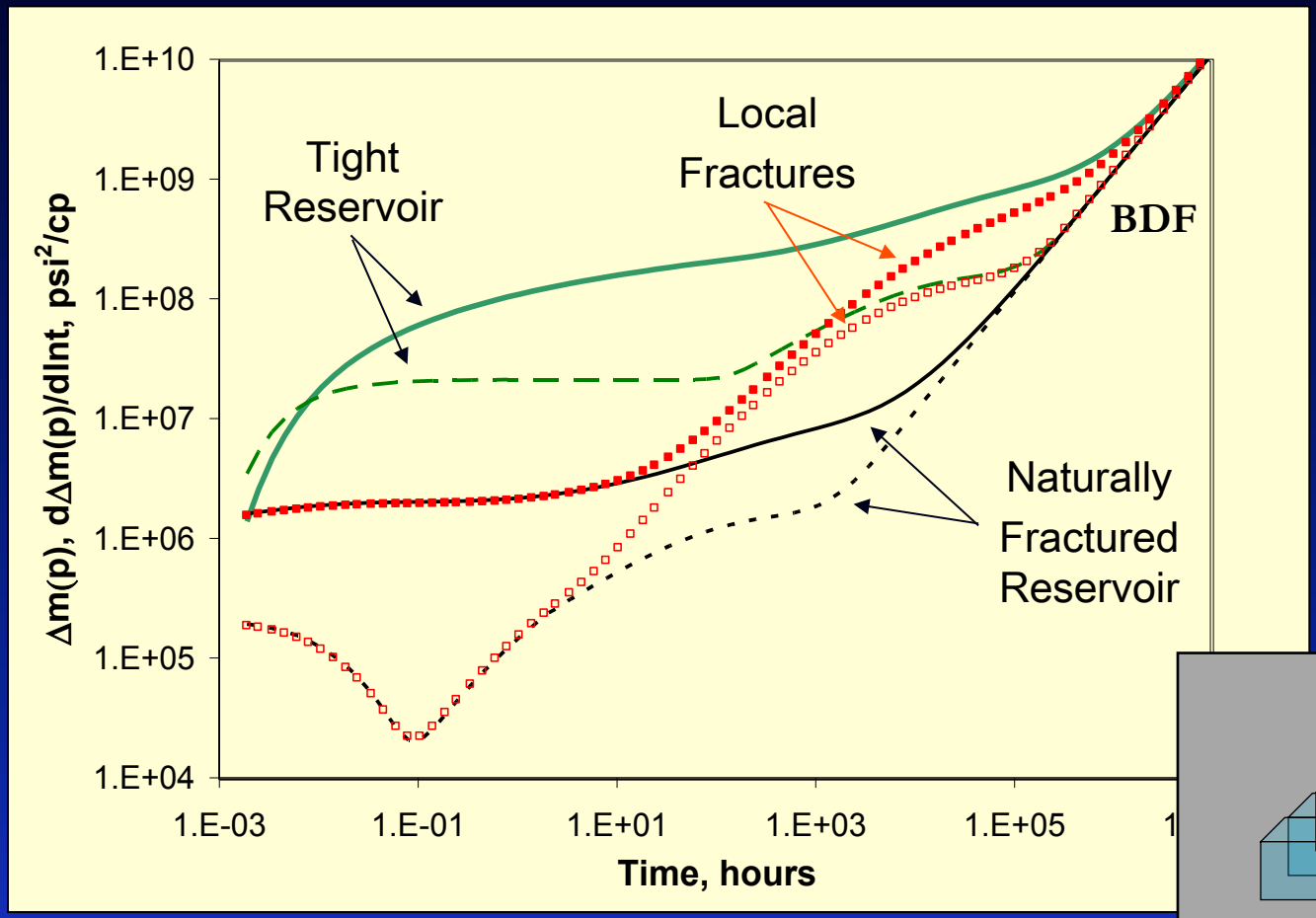


Block discretization

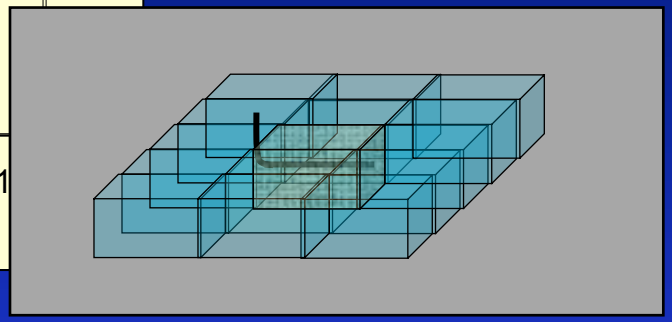


Previous Research

Horizontal Shale-Gas Well Drainage Area



Pseudopressure and derivative responses from semianalytical model

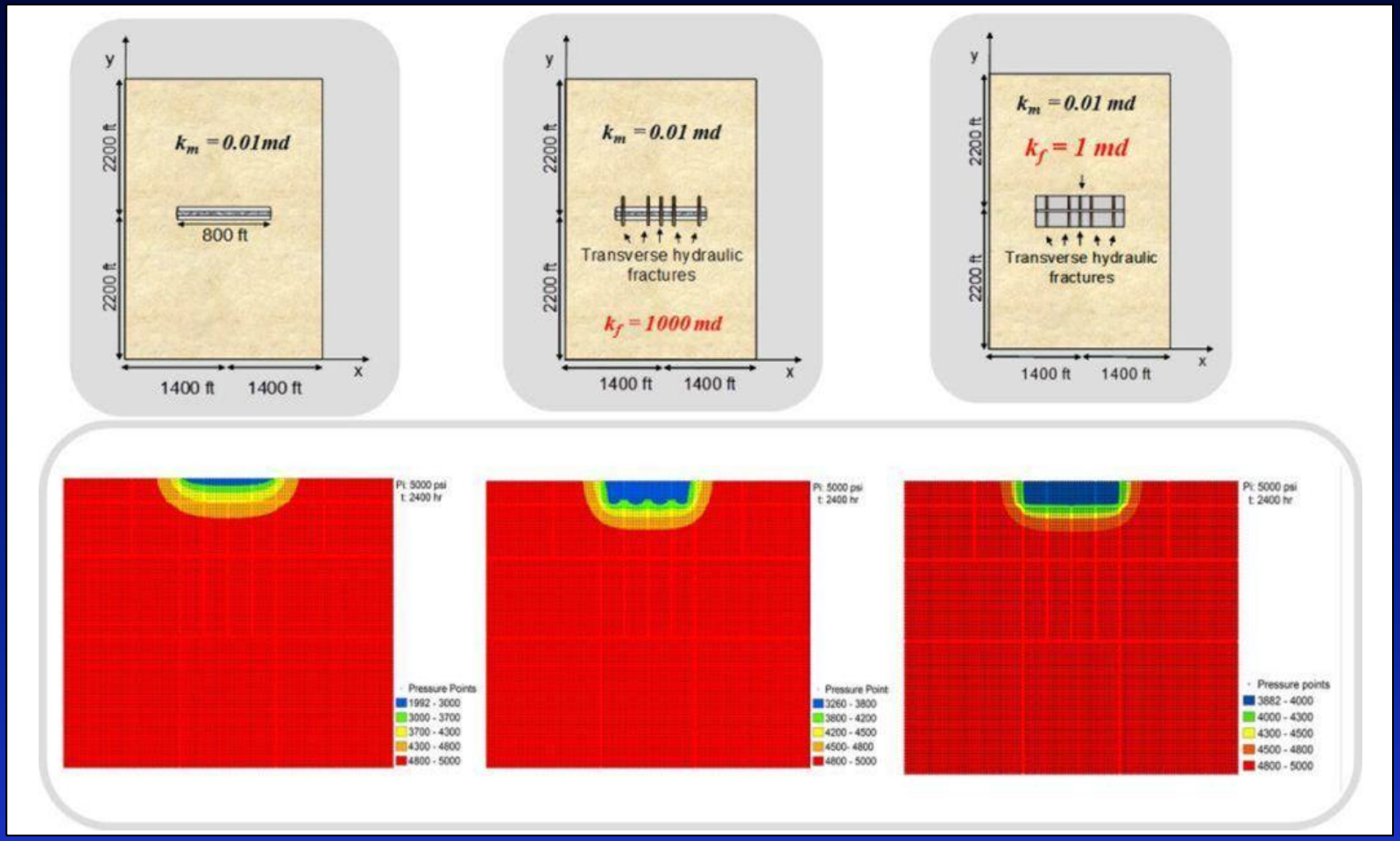


Medeiros, Ozkan, Kazemi, SPEREE 2008

Horizontal-Well Drainage Area in Shale

Effect of hydraulic fractures and SRV on drainage area

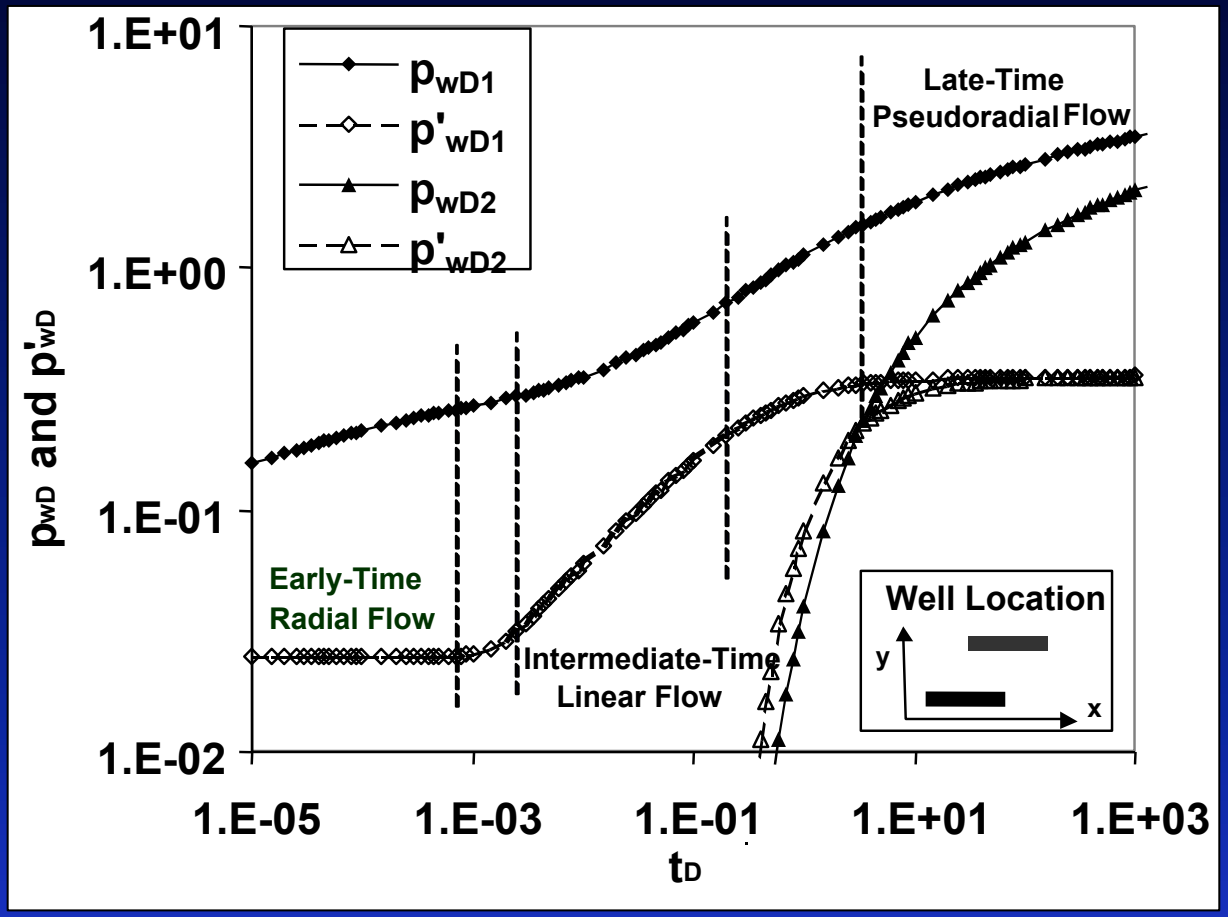
Medeiros, Ozkan, Kazemi, SPEREE 2008



Horizontal-Well Interference Problem

Interference between two horizontal wells; homogenous reservoir

Al-Khamis, Ozkan, Raghavan, SPEREE 2005

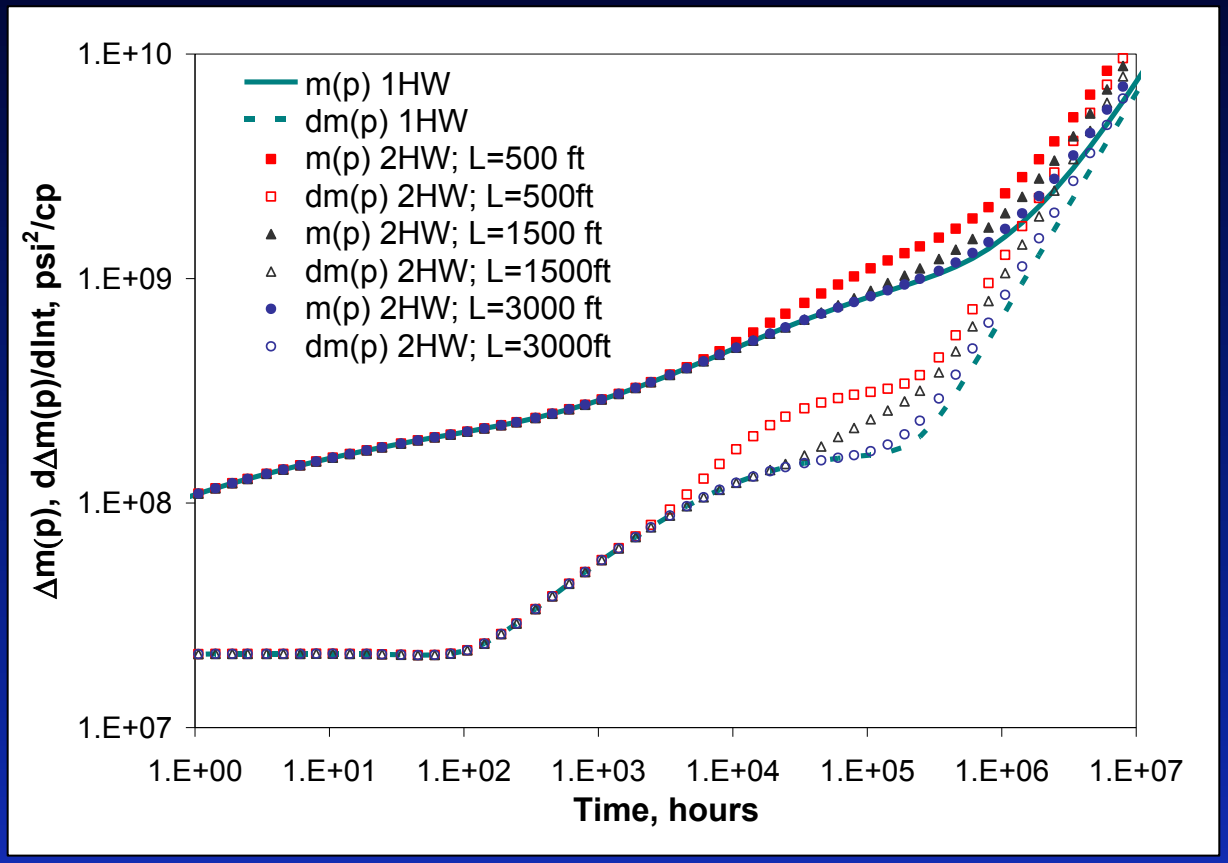


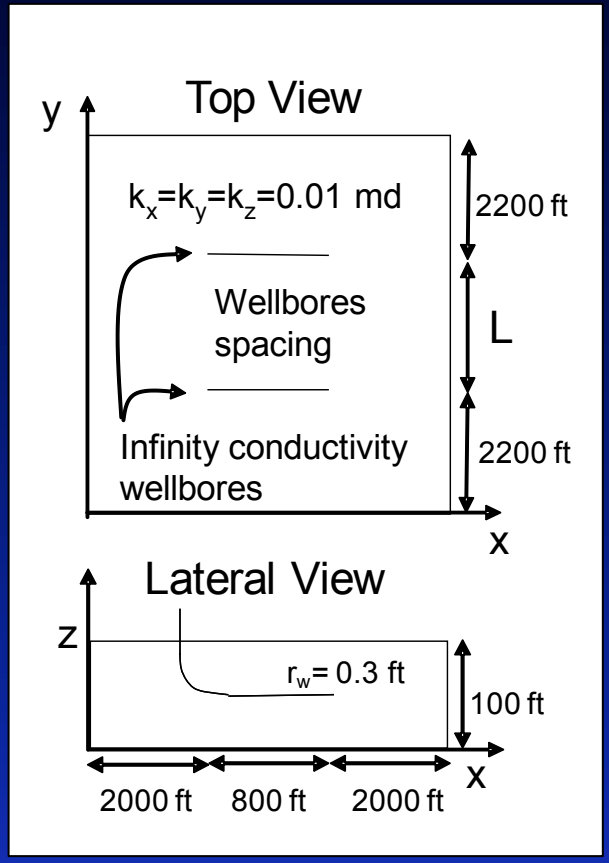
Analytical model based on superposition of two finite-conductivity horizontal wells

Horizontal-Well Interference Problem

Interference between two horizontal wells

Medeiros, Ozkan, Kazemi, SPEREE 2008





Semi-analytical model capable of handling SRV around wells

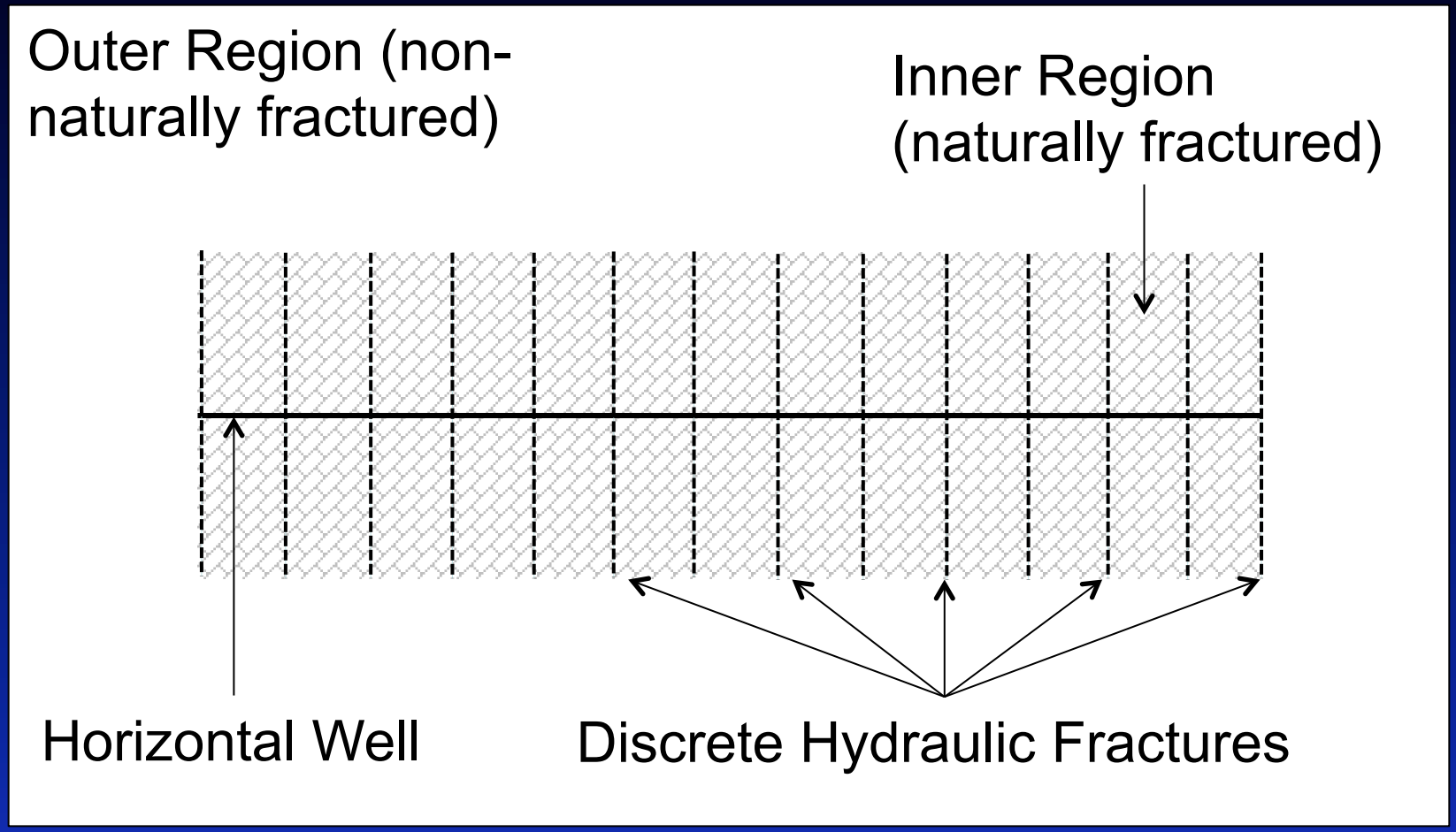
Analytical Model For Shale-Gas Wells

Model built by using semi-analytical method developed by Cinco-Let, et al. (1978) modified by Chen and Raghavan (1997).

This model uses multiple finite-conductivity fractures superimposed with a naturally fractured stimulated rock volume.

Using this model, we can emulate a tri-linear model, but it can experience pseudo-radial flow.

Approach


Outer Region (non-naturally fractured)
Inner Region (naturally fractured)
Horizontal Well
Discrete Hydraulic Fractures

Approach

Using this rigorous approach, we can examine:

- Fracture tip effects
- Drainage area
- Key variables that effect flow regimes
- Comparisons to tri-linear model
- Interference effects

Status

The model is currently being coded in Fortran95.

We are currently working through bugs in the code. Shown is an example of the Raghavan and Chen (1997)

Next step is to incorporate a second well into the model