Abstract Submitted
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Numerical simulation of flow in a horizontal channel with multiple cross-flow inlets[1] PRANAB N. JHA, Dept. of Mechanical Engineering, University of Houston, CHUCK SMITH, Apache Corp., Houston, RALPH W. METCALFE, Dept. of Mechanical Engineering, University of Houston — Flow in a horizontal channel with multiple cross-flow inlets was studied numerically. Based on Reynolds and Mach number analysis of data obtained from a horizontal natural gas well having 31 completion stages, measured at two different times in the production cycle, it was determined that an incompressible flow model may be applied to study a large fraction of the wellbore. Using five cross-flow inlets, the existence of three basic flow regimes - trickle flow, partially blocked flow and fully blocked flow - were identified with respect to the blocking of upstream inlets by the downstream ones. The existence of these flow regimes is consistent with field data. A lumped-parameter model for pressure drop was used to simulate large axial distances between two inlets. A pressure boundary condition was employed at each inlet to simulate a linearly depleting reservoir. This was used to study the dynamic interaction between the inlets in the channel. The characteristic time scales related to the transient depletion were identified and analyzed. The transition of flow regimes is consistent with the trends observed from field data and gives an insight into the behavior of horizontal wells.

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