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Flow interaction between multiple cross-flow inlets in a horizontal pipe or channel[1] PRANAB N. JHA, Dept. of Mechanical Engineering, University of Houston, CHUCK SMITH, Apache Corporation, Houston, RALPH W. METCALFE, Dept. of Mechanical Engineering, University of Houston — Incompressible flow in horizontal channels and pipes with multiple cross-flow inlets was studied numerically. Flow interference among the inlets was studied using an axisymmetric pipe flow model with five cross-flow inlets. 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 effects of inlet pressure and inlet size on the flow regimes under steady state conditions were studied. The presence of these regimes was supported by field data obtained from a horizontal natural gas well at two different times in the production cycle. Using a hydrostatic pressure model of reservoirs as the inlet boundary condition that drained fluid into the channel, the dynamic interaction of the inlets was studied. The transient behavior of the flow regimes was simulated and the key time-scales involved were identified. This is supported by field data where a similar behavior can be observed over time. Initially, the upstream inlets were in a blocked state, but opened up at a later time, leading to a trickle flow regime.

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