INTISARI

Salah satu peralatan bawah sumur (*sub-surface*) yang dipasang saat *completion* sumur adalah *sand control devices* untuk mencegah agar pasir di dalam *reservoir* tidak ikut terproduksi ke permukaan sumur. *Sand control devices* sebagian besar menggunakan *perforated pipe* sebagai *base pipe* yang terpasang pada lubang sumur (*wellbore*). Salah satu parameter penting yang mempengaruhi laju alir fluida dari *reservoir* menuju lubang sumur adalah *total pressure drop*.

Perforated pipe memiliki desain yang beragam tergantung dengan kebutuhan di lapangan. Dalam mendesain suatu *perforated pipe* maka yang perlu diperhatikan adalah jenis material dan dimensi *perforated pipe*, jumlah lubang (*perforation density*), sudut fasa dan pola distribusi lubang perforasi. Untuk dapat mengetahui perilaku pola aliran (*axial and radial inflow*) yang melalui *perforated pipe* sebagai *base pipe* dari *sand control devices* akibat pengaruh sudut fasa perforasi (60^o, 90°, 180°) dan pola distribusi lubang perforasi bentuk *staggered* dan *non-staggered* maka dilakukan simulasi numerik menggunakan *software* ANSYS 18.2. Model turbulen yang digunakan adalah k-ε *standard* dan simulasi dilakukan dengan 5 kondisi *flow rate ratio* yaitu 0%, 10%, 15%, 20% dan 30%.

Hasil simulasi pengaruh sudut fasa lubang perforasi pada kondisi tidak ada *radial inflow* (*flow rate ratio* 0%) menunjukkan perbandingan *total pressure drop* pada ketiga sudut fasa memiliki perbedaan yang saling berdekatan satu sama lain atau rata-rata sebesar 0,08%. Pada 4 kondisi *flow rate ratio* lainnya memperlihatkan bahwa sudut fasa 60° memiliki *total pressure drop* paling rendah dan secara berturut-turut memiliki perbedaan sebesar 3,77%, 5,10%, 3,88% dan 1,20% terhadap sudut fasa yang memiliki *total pressure drop* yang paling tinggi. Selanjutnya pengaruh pola distribusi lubang pada kondisi *flow rate ratio* 0% juga menunjukkan perbandingan *total pressure drop* yang saling berdekatan atau rata-rata sebesar 0,07%. Pada 4 kondisi *flow rate ratio* lainnya didapatkan bahwa pola distribusi model *non-staggered* memiliki *total pressure drop* paling rendah dan secara berturut-turut memiliki perbedaan sebesar 0,28%, 0,47%, 0,69% dan 1,27% terhadap pola distribusi lubang yang memiliki *total pressure drop* paling tinggi.

Kata kunci: *Perforated pipe, radial inflow, pressure drop,* sudut fasa, distribusi lubang.

ABSTRACT

One of sub-surface equipment installed during well completion are sand control devices to prevent sand in the reservoir from being produced to the surface. Sand control devices which installed in the wellbore mostly use perforated pipe as base pipe. One of the important parameters that influence the flow rate of fluid from the reservoir to the wellbore is total pressure drop.

Perforated pipe has various designs depending on requirement in the field. In designing a perforated pipe some parameters need to be considered are perforated pipe material and dimension, number of holes (perforation density), perforation phasing and perforation holes distribution pattern. To study the behaviour of fluid flow patterns (axial and radial inflow) through the perforated pipe as a base pipe of sand control devices due to the influence of perforation phasing (60°, 90 °, 180 °) and perforation holes distribution pattern in the form of staggered and non-staggered then numerical simulations were performed using ANSYS 18.2 software. Turbulent model used is k-ε standard and simulation is carried out with 5 flow rate ratio conditions (0%, 10%, 15%, 20% and 30%).

Simulation results on the effect of perforation phasing when no radial inflow (flow rate ratio 0%) shown that total pressure drop for 3 perforation phasing are close to each other (average 0.08%). The other 4 flow rate ratio shown that perforation phasing 60° has the lowest total pressure drop and has a difference of 3.77%, 5.10%, 3.88% and 1.20% respectively compared to perforating phasing that have the highest total pressure drop. Furthermore, the effect of the hole distribution pattern at flow rate ratio 0% also shown that total pressure drop for 3 holes distribution pattern are close to each other (average of 0.07%). In the other 4 flow rate ratio, it is found that the hole distribution pattern of non-staggered model has the lowest total pressure drop and has a difference of 0.28%, 0.47%, 0.69% and 1.27% respectively compared to hole distribution patterns that have the highest total pressure drop.

Keywords: Perforated pipe, radial inflow, pressure drop, perforation phasing, hole distribution.