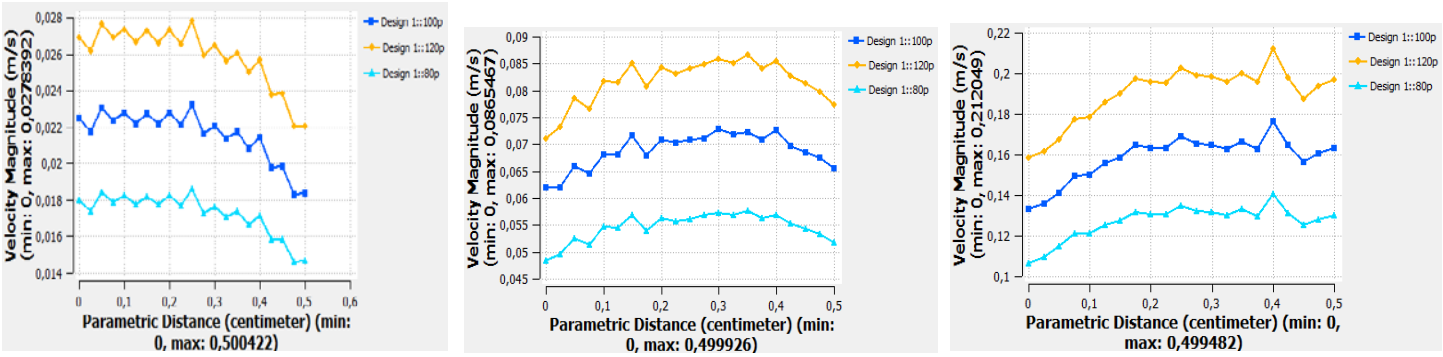
EFFECT OF THE PORE DIAMETER ON THE FLUID VELOCITY

Diameter has very significant role in affecting the fluid flow on the permeable membrane. Comparison of velocity magnitude between membranes that have pore size of 0.4 µm, 1 µm and 3 µm are shown in Figure 7 belows



Pore size 0.4 µm, Pore size 1 µm Pore size 3 µm

Figure 7. Comparison of velocity magnitude on the membrane surface

Based on Figure 7 shows that the speed of the biofluid flowing on the surface of the membrane is fluctuative due to the presence of a pore. Those pores cause some of the biofluid change its direction, flows into the pore microchannel, while the rest flows over the membrane. Such phenomenon then distort the velocity profile as shown in the above pictures. In this study it is found that the maximum fluid velocity flow that passes over the membrane with a pore size of 0.4 µm, 1 µm and 3 µm are 0.0302 m/s; 0.0725 m/s and 0.1352 m/s , each at a pressure of 120 mmHg. It is also found that the higher the pressure the higher the velocity of the fluid flowing over the permeable membrane. In the calculation, it is also found that the highest diffusion coefficient was obtained at a pore of 3 µm with an inlet pressure of 120 mmHg of 2.7 x 10-7 m^3 / s, and the smallest diffusion coefficient at a pore of 0.4 µm with an inlet pressure of 80 mmHg of 4.4 x 10-8 m^3 / s.

Conclusion

In this study it is found that the velocity profile of fluid flow over porous permeable membrane is highly affected by the pore size. The bigger the pore diameter the higher velocity magnitude. Bigger pore diameter also causes the higher diffusion coefficient. Pressure has linear trend with the fluid velocity over the surface of the membrane.

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