CHAPTER V
CONCLUSIONS AND RECMMOENDATIONS

5.1 Conclusions

A neutron scattering device, scatterometer, was studied to measure void fraction in an half-inch stainless steel pipe. The device was designed to be portable with the use of isotropic neutron source for high temperature and pressure.

The design scatterometer was evaluated by employing the Monte Carlo method. The results showed that the linearity between the void fraction and detector response was achieved. Therefore, there was the feasibility of this design scattering device.

To confirm the possibility of this design, the static experiment using lucite rods to simulate the water content in the pipe was carried out. The results showed the linearity between the estimated lucite fraction and real lucite fraction, which was close to the theoretical line. As a result, The possibility of measuring the void fraction was accomplished.

The actual water flow inside the pipe installed in the experimental loop was investigated by varying the density of compressed liquid at 5 Mpa. The compressed water density was proportional to the count rate even with high-pressure system. It was relevant to the fact that the possibility of neutron interaction is higher when the density of hydrogen atoms is higher. However, varying temperature and pressure to obtain the correlation between the steam quality and the count rate is recommended for future work. Most probably, this design scatterometer will be able to measure void fraction or steam quality in an on-line measurement.

5.2 Recommendations

For more accurate analysis:

1. Another scattering detector on the other side of the pipe is suggested.

2. Electronic noise, which may cause some points having a big standard error, should be eliminated by employing the single channel analyzer.
3. The external signals such as the noise from an operating pump that may cause an unusual count rate should be investigated.