









Fig. 5 Scale factor with phase retardation error

## V. Conclusion

Polarization error characteristics affect the accuracy and stability of the Sagnac fiber optic current sensor, then, we have carried out a theoretical investigation on the polarization error characteristics against the variations of the quality of polarizer, phase delay in quarter-wave retarder,  $45^\circ$  splice angular between quarter-wave retarder and PM fiber in S-FOCS. Imperfect polarizer in S-FOCS induces polarization degree error, however, polarized light-wave passing through the polarizer doesn't affect measurement accuracy, and phase to be measured in S-FOCS still meets the relationship of  $2VN$ , on condition of meeting minimum current resolution requirement. Intensity of two light-wave in fiber loop with clockwise and counterclockwise propagation direction distributes unequally, when splitting ratio of integrated optical chip in S-FOCS deviates 50:50, however, the splitting ratio error has no effect on S-FOCS's measurement accuracy. However, the scale factor of Sagnac fiber interferometer current sensor deviates from the value  $2VN$  when either the quarter-wave retarder is imperfect, or splice angular between quarter-wave retarder and PM fiber not equal  $45^\circ$ . In addition, linear birefringence in the fiber sensing lead is still major polarization error factors to consider.

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