chemical composition of the pore solution and the microstructure of the concrete and hence affect the measuring current of the RCPT.

Table 2. Test results from the RCPT, ACMT, and the ponding test

Mix No.	RCPT, Total charge passed (coulomb)	Diffusion coefficient ($\times 10^{-8}$ m^2/hour)	
		Ponding, D_p	ACMT, D_s
A0	5311	2.44	17.51
A20	4685	--	13.92
A40	2208	--	7.06
A50	1543	1.36	6.19
A70	1034	--	5.2
B0	7568	5.51	29.14
B20	5630	--	20.29
B40	2387	--	12.43
B50	1825	1.47	7.29
B70	1122	--	6.98
C0	9639	8.37	39.48
C20	6355	--	20.47
C40	2709	--	13.37
C50	2148	1.69	10.66
C70	1350	--	7.73
D0	10442	12.74	56.02
D20	7114	--	31.41
D40	2992	--	15.83
D50	2565	2.34	15.61
D70	1686	--	13.87

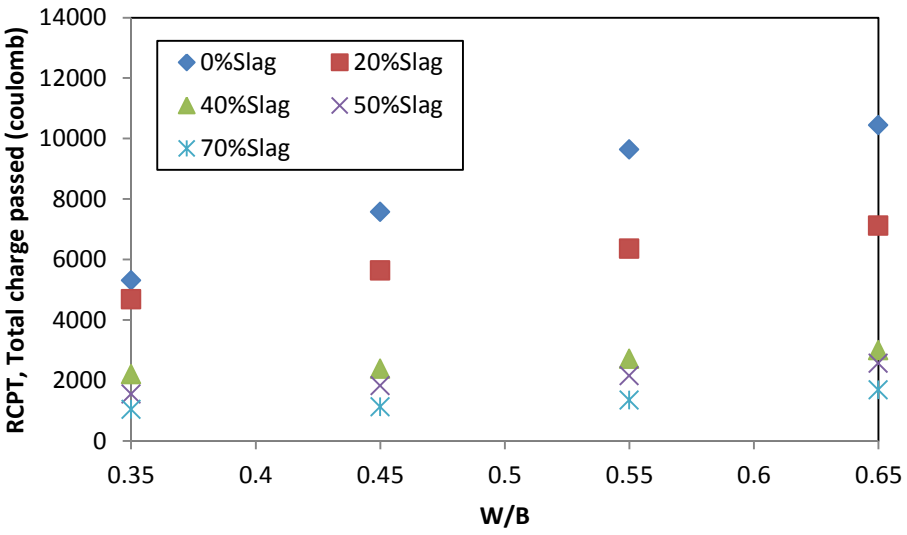

Fig. 1 The relationships between the total charge passed and W/B

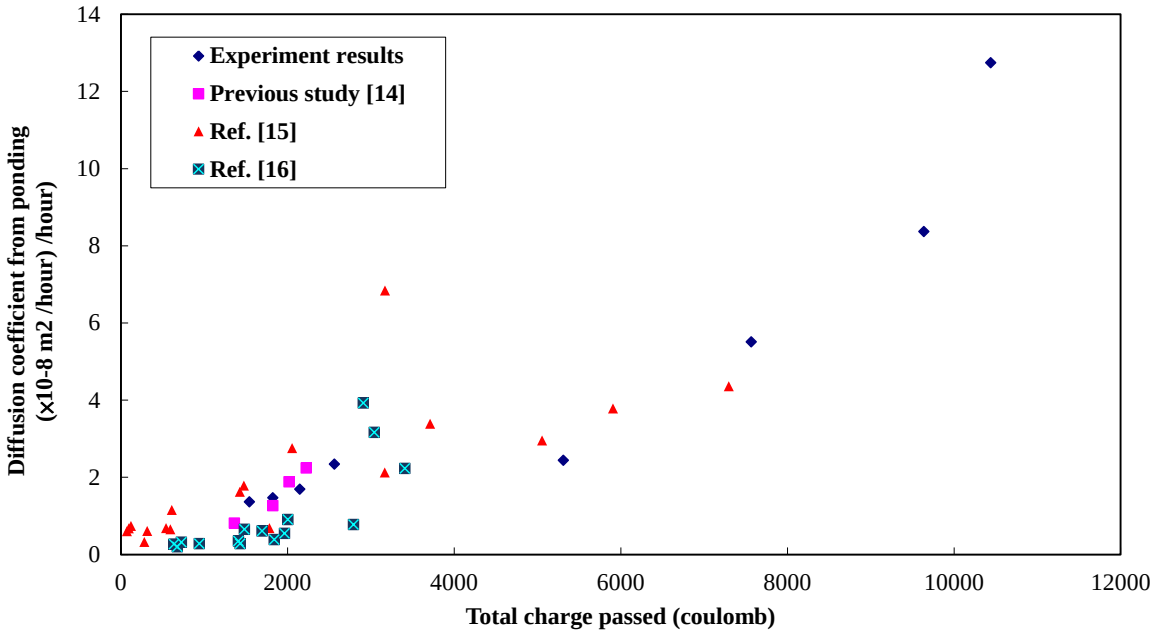

Fig. 2 The correlation between the chloride diffusion coefficient from the ponding test and the total charge passed

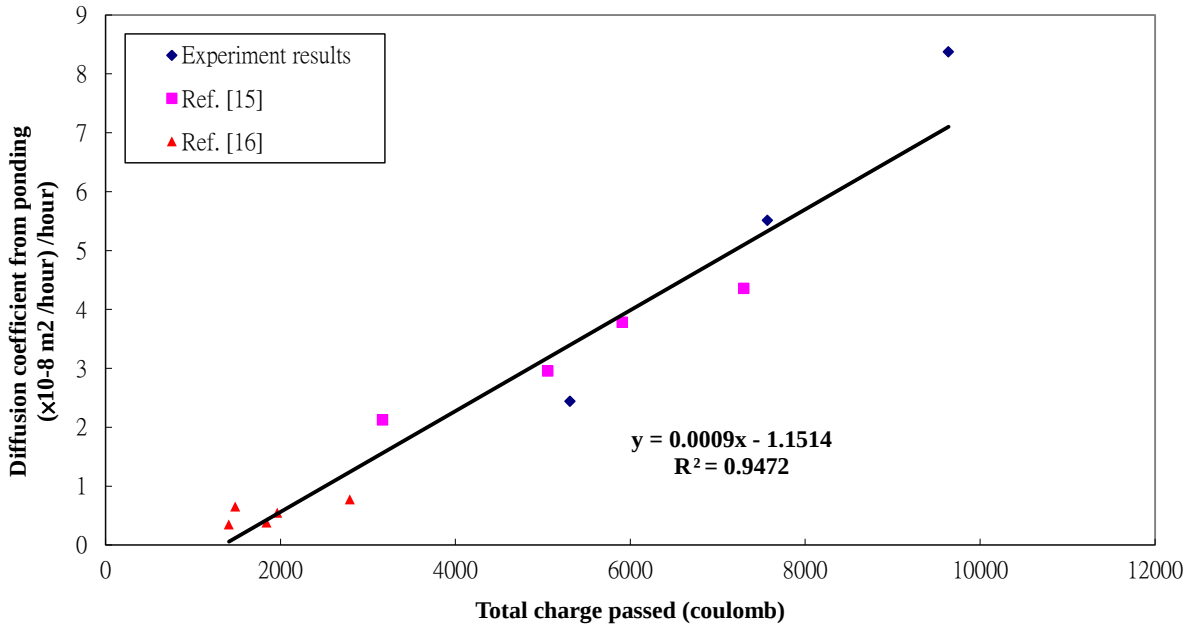

Fig. 3 The correlation between the chloride diffusion coefficient from the ponding test and the total charge passed (concrete mixes without mineral admixtures)

3.3 Steady-state diffusion coefficients from the ACMT

The diffusion coefficients obtained from the ACMT are listed in Table 2. Fig. 4 is the relationship between the steady-state diffusion coefficients and W/CM with different slag contents. The previous research results [14] are also plotted in this figure. It can be seen that the steady-state diffusion coefficient is decreased with the increasing of the slag content. For the concrete containing 25% fly ash, the steady-state diffusion coefficient is lower than that of the concrete containing 20% slag.

In Fig. 5, the steady-state diffusion coefficients from the ACMT are compared with the total charge passed from the RCPT. The results of the concrete adding fly ash [14] are also shown in this figure. It shows that no obvious correlation between the steady-state diffusion coefficient and the total charge passed, such as Fig. 3.

Fig. 6 shows the relationship between the steady-state diffusion coefficients from the ACMT (D_s) and the non-steady-state diffusion coefficient from the ponding test (D_p). By linear regression, the empirical relationship between D_s and D_p is statistically derived as:

$$Y = 0.2406x - 1.235 \times 10^{-8} \quad (1)$$

The R^2 for this regression Equation (1) is 0.972. It appears that D_s correlates linearly with D_p regardless of concrete with or without containing mineral admixtures. When comparing Fig. 6 and Fig. 3, it shows that the ACMT may be a more useful method than the RCPT, when the long-term chloride diffusion test is concerned.

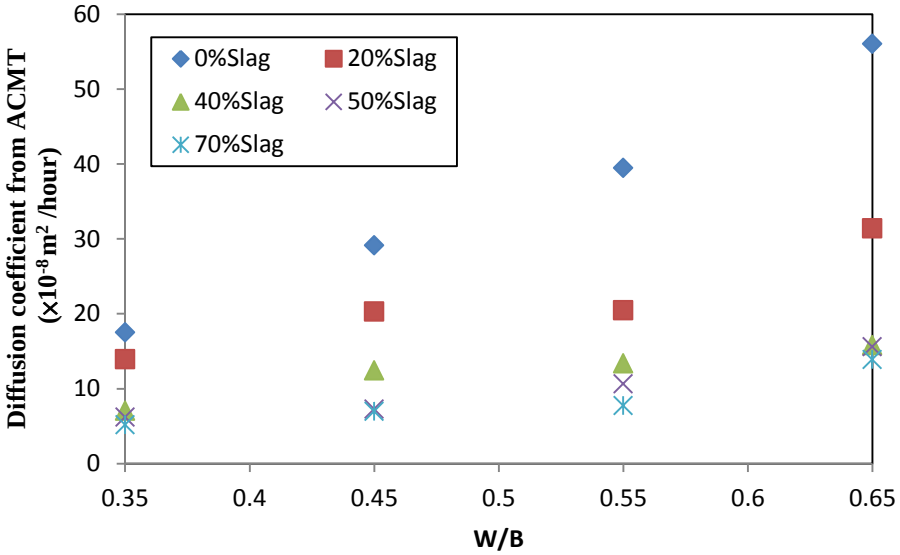

Fig. 4 The relationships between the steady state chloride diffusion coefficient from the ACMT and W/B

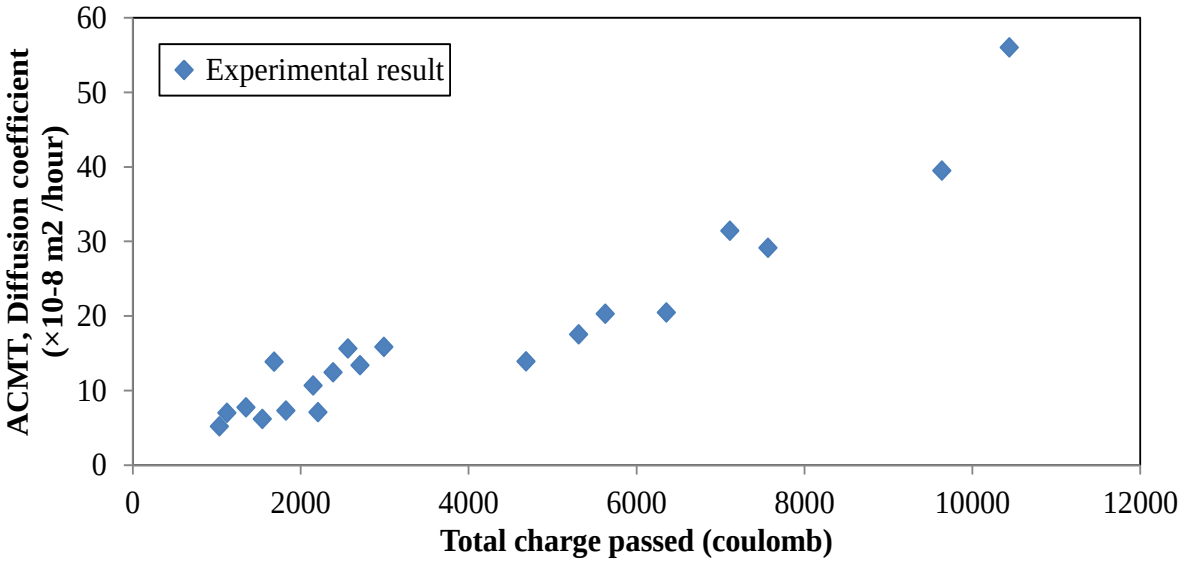

Fig. 5 Correlation between the steady state chloride diffusion coefficient from the ACMT and the total charge passed

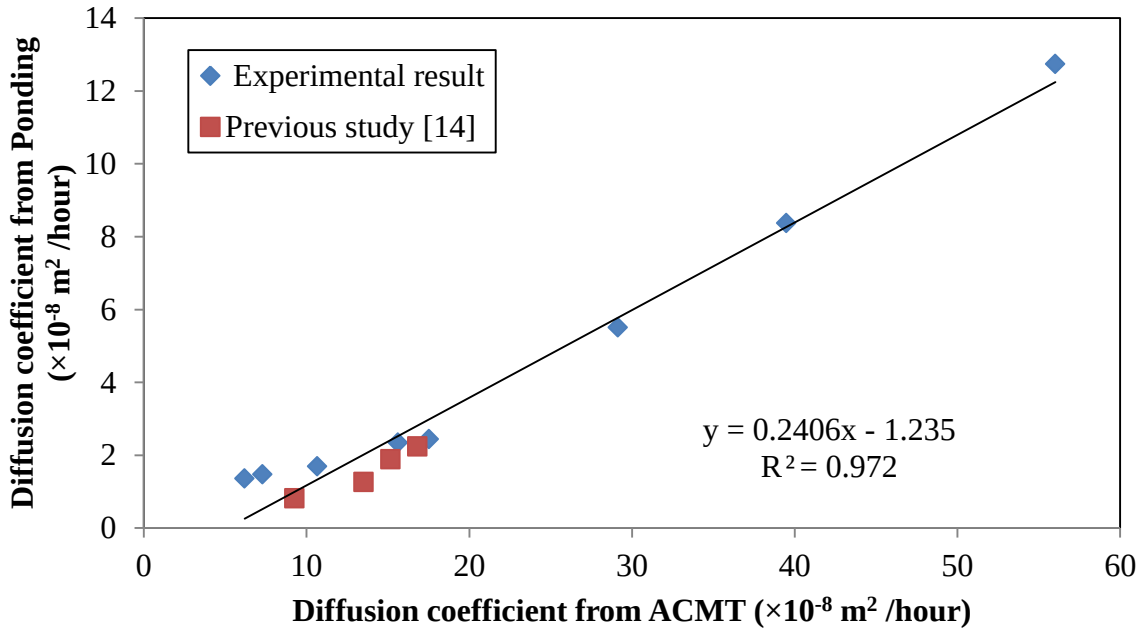

Fig. 6 Correlation between the steady state chloride diffusion coefficient from the ACMT and the non-steady state chloride diffusion coefficient from the ponding test

4. CONCLUSIONS

The conclusions of the experimental investigation are summarized as below:

1. The charge passed obtained from the RCPT and the steady-state diffusion coefficients obtained from the ACMT are decreased with the increasing of the slag

content.

2. For the concrete containing mineral admixtures, there is no obvious correlation between the non-steady-state diffusion coefficient obtained from the ponding test and the total charge passed obtained from the RCPT. But a good correlation was observed in the concrete without mineral admixtures.
3. There is no obvious correlation between the steady-state diffusion coefficient obtained from the ACMT and the total charge passed obtained from the RCPT.
4. A good correlation is observed between the steady-state diffusion coefficients from the ACMT and the non-steady-state diffusion coefficient from the ponding test. It appears that the ACMT may be a more useful method than RCPT, when concerning the long-term chloride diffusion test.

5. ACKNOWLEDGEMENTS

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