Laboratory of Construction Materials

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Ponding and Migration for chloride ingress study

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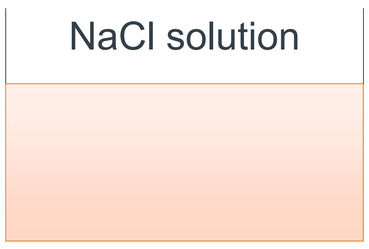
The techniques explained

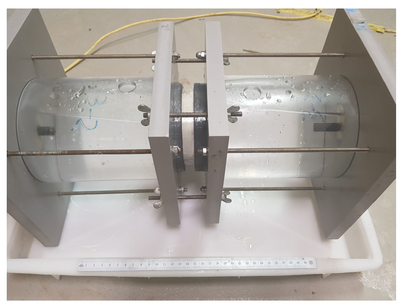
Ponding

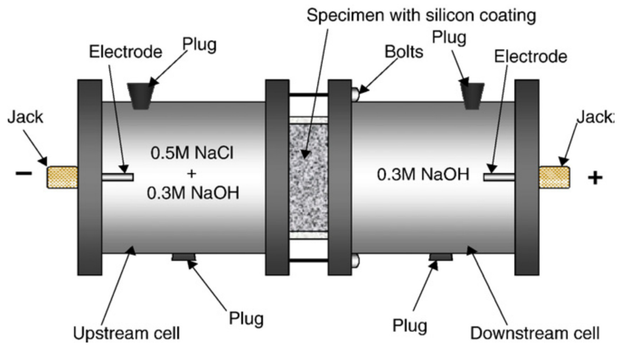
- Close to natural conditions
- [Cl^-]=0.5M
- Neutral pH
- Thick samples
- Measure of chloride concentrations as a function of depth
- 6 months to a few years
  → can be compared to real structure cores



Migration

- Accelerated conditions: applied voltage to accelerate diffusion
- [Cl^-]=0.5M
- High pH
- Thin samples (3cm)
- Measure of current, analysis with numerical model
- ~ 2 weeks
  → faster to carry out in labs

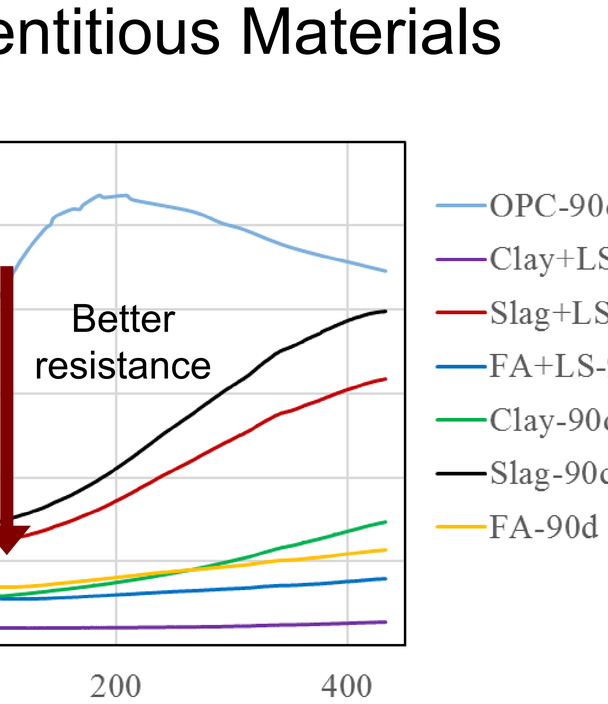




What can we get from the techniques

Chloride ingress is one of the main degradation process of reinforcement concrete.
Source of chlorides include seawater or de-icing salts.

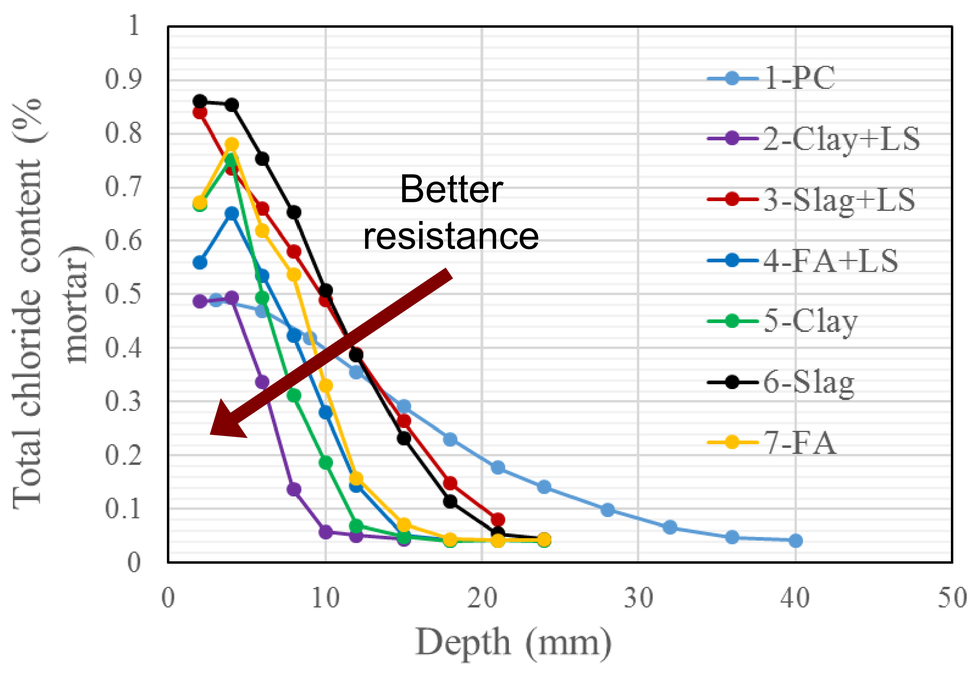
These techniques can be used to
- predict the service life of infrastructure and buildings
- classify the resistance of different formulations
- understand the mechanisms behind chloride ingress



Ponding provides a result close to real structure while migration is faster to run, and it can be analysed with numerical models to provide microstructure information.

Applications

Classification of Supplementary Cementitious Materials



Same trends between the two techniques, SCMs improves chloride resistance.

LC3 formulation (OPC, clay and limestone) shows the best resistance.

Coupling with microstructure techniques (XRD, MIP, SEM-EDX, …) provides a better understanding of the underlying mechanisms.

References: *Samson et al., Materials and Structure (2003)*

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