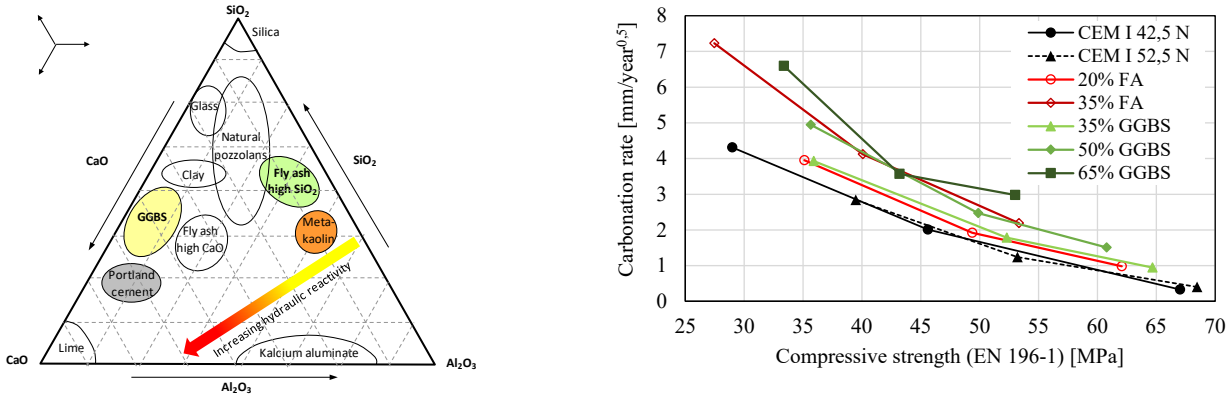
Durability properties of SCMs

Master's project for the Master Program Structural Engineering and Building Technology

Background

The use of supplementary cementitious materials (see Figure 1) is increasing due to a number of reasons such as reduced environmental impact but also improved durability. The supplementary cementitious materials cause a change in the hydration and the hydrates formed, which in turn leads to modified properties with respect to durability. For new types of supplementary cementitious materials (SCMs) there is need to assess durability properties such as rate of carbonation, chloride migration coefficient, and freeze-thaw resistance.



(a) *(b)*

Figure 1. (a) Chemical composition (main components) of different binders. (b) Carbonation rate versus compressive strength.

Purpose/Method

This master thesis proposal aims to investigate the effect of new types of SCMs (e.g., ground pumice, alternative ashes, etc.) on strength and durability properties will be evaluated. Experiments will be conducted based on the following standards and methods: accelerated carbonation EN 12390-12; rapid chloride migration coefficient (EN 12390-18); freeze-thaw resistance (CEN/TS 12390-9); and capillary absorption (EN 13057).

Impact

A better understanding of hydration of new types of supplementary cementitious materials and how they influence durability. This is a direct response to the growing need for material specialists who understand cementitious materials and with modelling capabilities with respect to durability.

Thesis setup information

The master thesis will be carried out at Thomas Concrete Group in collaboration with Chalmers University of Technology. This Master Thesis work will be part of an ongoing project and is suitable for students interested in concrete technology, experimental work and theoretical modelling.

Supervisor team:
Ingemar Löfgren, Adj. Professor, Chalmers, Ingemar.lofgren@c-lab.se