Kishi Lab.

Evaluation of Thermal Cracking Sensitivity of Blended Portland Cement Concrete

[INTRODUCTION]

Cracking is a popular problem in concrete engineering, especially thermal cracks at early-age Occurrence of cracks let aggressive agent easier to enter into concrete and thus accelerate deterioration process such as carbonation and reinforcing bar corrosion. As a result, the required performance of structure is shortened. All kind of crack particularly thermal crack therefore must be prevented.

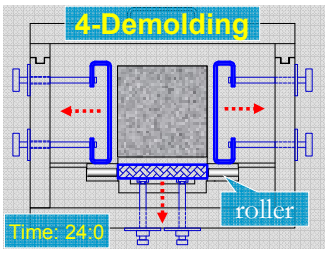
Nowadays, there are many materials that can be combined in concrete manufacture to improve early-age cracking resistance such as fly ash, blast furnace slag for low hydration heat, expansive agent for shrinkage compensation and lightweight aggregate for internal curing. This study is therefore to evaluate thermal cracking sensitivity of these materials in concrete and then is to mitigate thermal cracking in massive concrete.

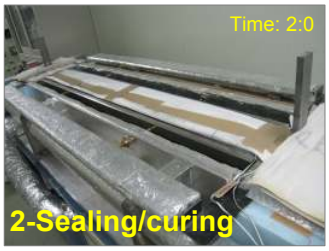
[EXPERIMENT]

Equipment

TSTM was used to evaluate the thermal cracking sensitivity under test condition of full restraint, sealed curing and semi-adiabatic temperature.

Experimental procedure

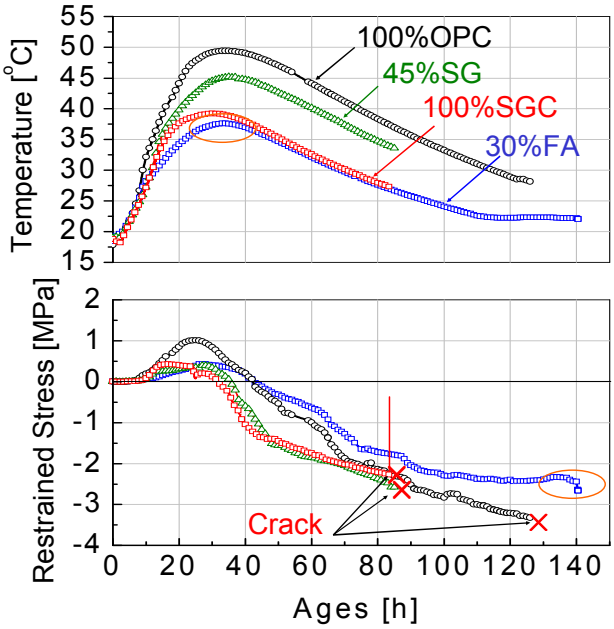




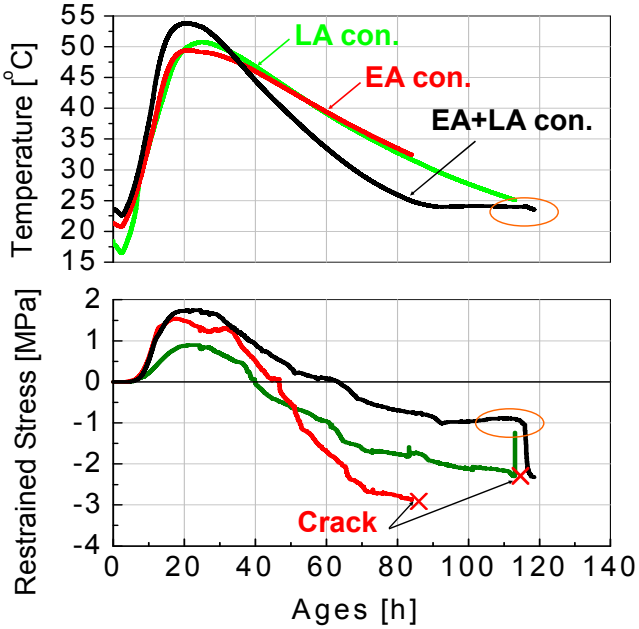
The measuring process took around 7 days until specimen was crack or specimen temperature return to indoor temperature.

[RESULTS]

Fly ash and slag concrete



Combination of expansive agent and lightweight aggregate



[CONCLUSION]

In full restraint and sealed curing condition:

1. Slag increases thermal cracking sensitivity of concrete.
2. Fly ash can mitigate thermal cracking of concrete.
3. Light weight aggregate or expansive agent can not overcome thermal cracking of OPC concrete.
4. Combination of expansive agent and lightweight aggregate bring good performance to resist thermal cracking.