アルカリ骨材反応と鉄筋腐食によるコンクリートの複合劣化機構

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1997 Fiscal Year Final Research Report Summary

Mechanisms of Combined Effects of AAR and Reinforcement Corrosion on Concrete

Research Project

Project/Area Number

08650530

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

土木材料・力学一般

Research Institution

KANAZAWA UNIVERSITY

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Keywords

Sodium Nitrite / Calcium Nitrite / Ettringite / Corrosion / Steel Bar / ASR Gel / Interfacial Transiiton Zone / Sulfate Ion

Research Abstract

We could propose a new thought on the mechanisms of the promotion of ASR due to sodium chloride and sea water through detailed experiments concerning the effects of externally supplied sea water and sodium chloride solution on ASR and the process of ASR chemical reaction in mortars with and without NaCl. Furthermore, the changes in pore solution composition with time at various depths from the surfaces of specimens and their relation to the corrosion of reinforcement steel bars in the specimens were elucidated. Another important result was a finding on the relation between the effectiveness of nitrites and the pore solution composition in mortars containing the nitrites.
The major results obtained were summarized as follows ;
(1) The Cl-/OH- ratios in mortars in 0.51Mm NaCl solution were greater than in sea water at 360 daysafter, immersion. The formation of dense layrs aragonite and brucite might hinder the intrusion of the Cl- ions into mortar cylinders and the leakage of OH- ions from them.
(2) From a point of view of the pore solution composition, far greater corrosion degree in steel bars in reactive. aggregate-containing mortars was unexpected.
(3) Replacement of greater amounts of reactive aggregate for standerd sand in mortars resulted in less degree of corrosion in steel bars except one case. The depression of corrosion in reactive aggregate-containing mortars in sea water and NaCl solution appears to result from the formation of homogeneous ASR gel layrs surrounding the steel bars.

Research Products (9 results)

All Other

All Publications (9 results)

[Publications] 川村 満紀、谷川 伸、古東 秀文: "モルタル中の細孔溶液の組成からみた亜硝酸塩の鉄筋防錆効果" コンクリート工学論文集. 第8巻第1号. 75-84 (1997)

[Publications] M.Kawamura K.Takeuchi: "Alkali-Silica Reaction and Pore Solution Composition in Mortars in Sea Water" Cement and Concrete Research. Vol.26No.12. 1809-1819 (1996)

[Publications] M.Kawamura S.Komatsu: "Behavior of Various Ions in Pore Solution in NaCl-Bearing Mortar With and Without Reactive Aggregate at Early Ages" Cement and Concrete Research. Vol.27No.1. 29-36 (1997)

[Publications] M.Kawamura, S.Tanikawa R.N.Swamy, H.Koto: "Pore Solution Composition and Electrochemical Behavior of Steel Barsin Mortars with Nitrite Corrosion Inhibitors" Proc.of FIFTH CANMET/ACI Conf.on Superplasticizers and other Chemical Admixtures in Concrete. 35-53 (1997)

[Publications] M.Kwamura D.Singhal Y.Tuji: "Effects of ASR on Corrosion of Reinforcement in Concrete under Saline Environments" Proc.of East Asia Alkali-Aggreg ate Reaction Seminar. 179-190 (1997)

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