

Applicability of high carbon ferrochromium slag as an aggregate for ultra high strength concrete

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2000 Fiscal Year Final Research Report Summary

Applicability of high carbon ferrochromium slag as an aggregate for ultra high strength concrete

Research Project

Project/Area Number

09555135

Research Category

Grant-in-Aid for Scientific Research (B).

Allocation Type

Single-year Grants

Section

展開研究

Research Field

土木材料・力学一般

Research Institution

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Keywords

high carbon ferrochromium slag / high strength concrete / RPC / late hydration / expansive pressure / volume stability / hydrothermal / tobermorite

Research Abstract

In order to use high carbon ferrochromium slag as an aggregate for ultra high strength concrete, mineralogical compositions of the slag and its alkali reactivity in cementitious matrix are investigated. Effects of its reactivity and surface texture on mechanical properties of high strength mortars and RPC (Reactive Powder Concrete : ultra high strength concrete) were investigated in terms of characteristic microstructures and microscopic failures. The major outcomes in this study are as follows.

- (1) The high carbon ferrochromium slag has the potential reactivity with cement paste matrix.
- (2) The reaction of the slag with alkaline cement matrix does not result in the deterioration of concrete due to alkali silica reaction.
- (3) The reaction and rough texture of the slag particles contribute to the increase in bond strength and crack growth resistance.
- (4) When silica fume mortars with an extremely low water/binder ratio were cured in water, shrinkage and swelling occurred simultaneously.
- (5) Generation of internal expansive pressure due to the late cement hydration should be taken into account as a mechanism to cause microcracks in mortars with low water/binder ratios.
- (6) The slag can be used as an aggregate for ultra high strength concrete. However, the optimum mix proportion and the thermal treatment for the concrete with the slag may be different than those for concretes with natural aggregates. Dissolution of silica in the slag affects the growth of crystalline reaction products and their morphology.

Research Products (16 results)

All Other

All Publications (16 results)

[Publications] Igarashi,S.,Kawamura,M.,Arano,N.and Kawaguchi,S.: "Alkali reactivity of high-carbon ferrochromium slag and its applicability as an aggregate for concrete"Proc.of the 10th Intl.Conf.on the Chemistry of Cement,. Vol.4. 4iv05 (1997) ▼

[Publications] Igarashi,S.,Kawamura,M.and Kawaguchi,S: "Mechanical properties of mortar containing high carbon ferrochromium slag as an aggregate"Proc.of Internationa.Conference on Engineering Materials. Vol.11. 63-71 (1997) ▼

[Publications] 五十嵐心一,荒野憲之,川村満紀,川口外秋: "高炭素フェロクロムスラグモルタルの力学的性質と微視的破壊特性"コンクリート工学年次論文報告集. Vol.19,No.1. 319-325 (1997) ▼

[Publications] 五十嵐心一,川村満紀,渡辺暁央: "画像解析によるモルタルの細孔径分布の測定"コンクリート工学年次論文報告集. Vol.22,No.2. 697-702 (2000) ▼

[Publications] Igarashi,S.,Kubo,R.H.and Kawamura,M.: "Long-term volume changes and microcracks formation in high strength mortars"Cement and Concrete Research. Vol.30,No.6. 943-951 (2000) ▼

[Publications] 五十嵐心一,川村満紀,渡辺暁央: "画像解析によるモルタルの細孔径分布の測定"コンクリート工学年次論文報告集. Vol.22,No.2. 697-702 (2000) ▼

[Publications] 久保ホベルト洋,五十嵐心一,川村満紀: "高強度モルタルの体積変化と微細ひびわれ発生機構"コンクリート工学論文集. 第11巻,第3号. 71-76 (2000) ▼

[Publications] 五十嵐心一,川村満紀: "RPCの製造と力学的特性に関する基礎研究"セメント・コンクリート論文集. No.54(印刷中). (2001) ▼

[Publications] Igarashi, S., Kawamura, M., Arano, N., Kawaguchi, S.: "Alkali reactivity of high carbon ferrchromium slag and its applicability as an aggregate for concrete"Proc.of the 10th Intl.Conf.on the Chemistry of Cement, Gothenburg. Vol. 4. 4iv051 (1997) ▼

[Publications] Igarashi, S., Kawamura, M., Kawaguchi, S.: "Mechanical properties of mortar containing high carbon ferrochromium slag as an aggregate"Proc.of Intl.Conf.on Engineering Materials. Vol.1. 63-71 (1997) ▼

[Publications] Igarashi, S., Arano, N., Kawamura, M., Kawaguchi, S.: "Mechanical properties of mortar with high carbon ferrochromium slag and their relation to the features of microscopic failure in the interfacial zone (in Japanese)"Proc.of the Japan Concrete Institute. Vol.1, No.1. 319-326 (1997) ▼

[Publications] Igarashi, S., Kawamura, M.: "Reduction in strength in high strength mortars at long ages"Proc.of Intl.Conf.on Fracture Mechanics of Concrete Structures. Vol.1. 243-252 (1998) ▼

[Publications] Igarashi, S., Kawamura, M., Watanabe, A.: "Evaluation of pore size distributions in mortars by SEM image analysis (in Japanese)"Proc.of the Japan Concrete Institute. Vol.22, No.2. 697-702 (2000) ▼

[Publications] Igarashi, S., Kubo, R.H., Kawamura, M.: "Long-term volume changes and microcracks formation in high strength mortars"Cement and Concrete Research. Vol.30, No.6. 943-951 (2000) ▼

[Publications] Kubo, R.H., Igarashi, S., Kawamura, M.: "Long-term volume changes and microcracks formation in high strength mortars (in Japanese)"Concrete Research and technology. Vol.11, No.3. 71-76 (2000) ▼

[Publications] Igarashi, S., Kawamura, M.: "Microstructure and strength of RPC produced at different curing temperatures (in Japanese)"Cement Science and Concrete Technology. No.54 (in press). (2000)



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