

*The recipients of 2005 JSCE Awards for papers relating to concrete engineering*

**Best Paper Award**

**Durability Evaluation Method for Railway Concrete Structures** (combined title)



**Chikara KAWAMURA**  
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**Masashi HASEGAWA**  
(←ditto)



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**Masamichi SOGABE**  
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**Koji HIGASHIGAWA**  
(Shikoku Railway Company)



**Tsutomu SATO**  
(Railway Technical Research Institute)



**Seichi TOTTORI**  
(←ditto)

**Durability Evaluation Method of Carbonation for Railway RC Rigid Frame Viaducts**

*Journal of Materials, Concrete Structures and Pavement, No.760/V-63, pp.147-157, 2004.5*

[Abstract]

It is necessary to understand the influence of environmental conditions quantitatively to apply evaluation methods for durability of carbonation to existing structure because carbonation rate varies by environmental conditions. In this research, it is shown that carbonation rate varies by height in columns, the sunshiny and rain condition, based on investigations of railway RC rigid frame viaducts after tens of years from completion. Then, it is clarified to be able to presume carbonation depth within about 10mm in the error margin when the evaluation method that JSCE adopts is used.

**Investigation of Construction Errors of the Cover for Railway RC Rigid Frame Viaducts**

*Journal of Materials, Concrete Structures and Pavement, No.767/V-64, pp.253-266, 2004.8*

[Abstract]

To evaluate the durability of a concrete structure, it is important to secure the precision of the cover. In this study, we surveyed the construction errors of the covers of railway RC rigid frame viaducts constructed in recent years, and clarified that the errors in covers were different at different parts and larger with pillars caused by the overall shift of reinforcing bars. Based on the study results, we proposed a value of allowable construction error for the design

of railway RC rigid frame viaducts.

**Study on the Penetration of Chloride Ions into Concrete Based on Investigation of Railway Structures**

*Journal of Materials, Concrete Structures and Pavement, No.781/V-66, pp.193-204, 2005.2*

[Abstract]

Chloride ions that come flying from the sea are known to be different in different regions. However, there are few reports on the chloride ions on the concrete surface in different areas. In this study, we investigated the chloride ion density on railway concrete structures at 142 places near the coast, and confirmed that the chloride ions on the concrete surface were different in different regions and depending on the distance from the coast. Based on the study results, we proposed a value of the chloride ion density on the concrete surface to be used for durability evaluation.

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## **Incentive Award for Young Researcher**

**Calcium Leaching Modeling of Strong Coherency with Micropore Formation of Cementitious Composite Material and Ion Phase Equilibrium** (combined title)



**Kenichiro NAKARAI**  
(The University of Tokyo)

**Calcium Leaching Modeling of Strong Coherency with Micropore Formation of Porous Media and Ion Phase Equilibrium**

*Journal of Materials, Concrete Structures and Pavement, No.802/V-69, pp.79-96, 2005.11*

[Abstract]

The authors presented a computational system that can predict long-term degradation of cement hydrate due to calcium leaching. For simulating leaching of calcium ion, equilibrium of calcium ion in solid and liquid and ion transport were formulated on the basis of thermodynamics theory. The time-dependent material properties of cement hydrate were evaluated considering the inter-relationship of hydration, pore-structure development and moisture transport based upon fundamental physical material models. The proposed model can reasonably predict the calcium leaching in concrete.

**Multi-phase Physicochemical Modeling of Soil-Cementitious Material Interaction**

*Journal of Materials, Concrete Structures and Pavement, No.802/V-69, pp.137-154, 2005.11*

[Abstract]

Multi-phase physicochemical modeling based on thermodynamic approach is studied on gel and capillary pores of nano-micrometers and large voids of micro-millimeters among soil foundation. A computational method about transportation of moisture and ions in pore structure for simulating concrete performance was extended for predicting time-dependent material properties of cemented soil. The proposed model was verified with experimental results of cement hydration, change of relative humidity and leaching of calcium ion from cement hydrate to underground water.

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**Yoshida Prize (Paper division)**

**Experimental Study on Shear Capacity Evaluation of RC Beams with PVA Short Fiber**  
*Journal of Materials, Concrete Structures and Pavement, No.774/V-65, pp.123-138, 2004.11*



**Mitsuyasu IWANAMI**  
(The Port and Airport Research Institute)



**Hiroshi YOKOTA**  
(←ditto)



**Hajime ITO**  
(Maeda Corporation)

[Abstract]

This paper describes experimental results of shear capacity of concrete beams reinforced by PVA short fiber. Loading test was carried out on reinforced concrete beams with PVA short fiber by changing fiber type, fiber content, shear reinforcement ratio, effective depth, and shear span-to-effective depth ratio. As a result, it was confirmed that shear capacity is improved by mixing PVA short fiber and that the increase in shear capacity is influenced by fiber content and specimen size.

The fiber was confirmed to effectively act in tied-arch beams. Therefore, an equation to estimate shear capacity for reinforced concrete beams with small shear span-to-effective depth ratio was modified by using the breaking point stress of tension softening curve and the effective depth of beam to express the capacity of the beams reinforced by PVA short fiber.

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**Yoshida Prize (Paper division)**

**Reversal Cyclic Loading Test of Reinforced Concrete Column Reinforced by Inside Round Hoop Bar**

*Journal of Materials, Concrete Structures and Pavement, No.795/V-68, pp.95-110, 2005.8*



**Tadayoshi ISHIBASHI**  
(East Japan Railway Company)



**Takahiro KANNO**  
(ditto)



**Junichi KINO**  
(ditto)



**Kaoru KOBAYASHI**  
(ditto)



**Kazuhiro OBARA**  
(ditto)

[Abstract]

The seismic design has been revised to give so high seismic requirement after Hanshin-Awaji earthquake disaster. Usually we design the reinforced concrete viaduct for Railway to have high deformation capacity. So we carried out reversal cyclic loading test using reinforced concrete model column reinforced by inside round hoop bar to give so high seismic requirement. This paper mainly presents the deformation properties and damage by the results of reversal cyclic loading test of this model column.