What is Innovation? Originality? in Concrete Engineering / Research: Contribution and Collaboration of Foreign Students in Concrete Labo. in Kyushu University

濱田, 秀則
Kyushu University

What is Innovation ? Originality ?
in Concrete Engineering / Research

- Contribution and Collaboration of
Foreign Students in Concrete Labo.
in Kyushu University

Hidenori Hamada
Kyushu University, Fukuoka, Japan

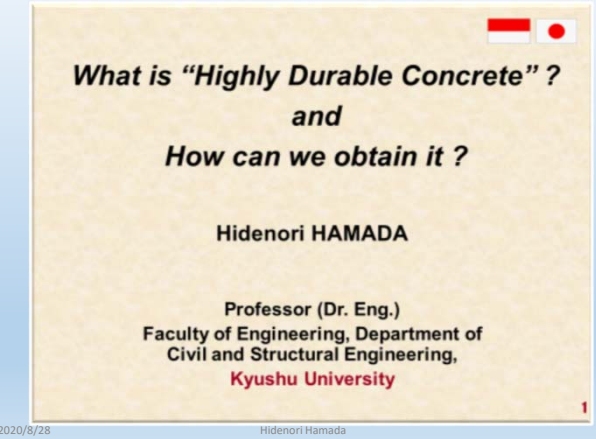
28 August 2020

My Presentation History in Makassar invited or arranged by Hasanuddin University

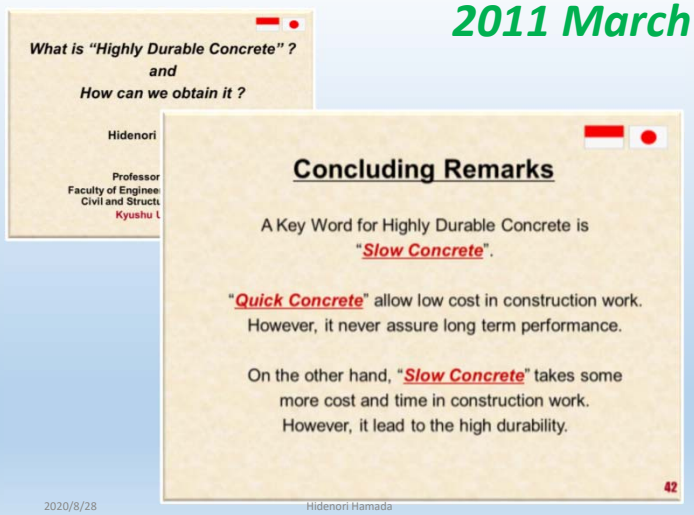
- **2011 March 1st Visit**
- **2014 June 2nd Visit**
- **2017 March 3rd Visit**
- **2020 August 4th On-line**

- **I appreciate to the Organization of 2020 (The 5th International Symposium on Infrastructure Development), for inviting me as one of Invited Speakers.**
- **Especially, thank you very much *Rita-san* for picking up my name.**
- **It is my great honor and pleasure to be here and make a presentation.**

2011 March



2011 March

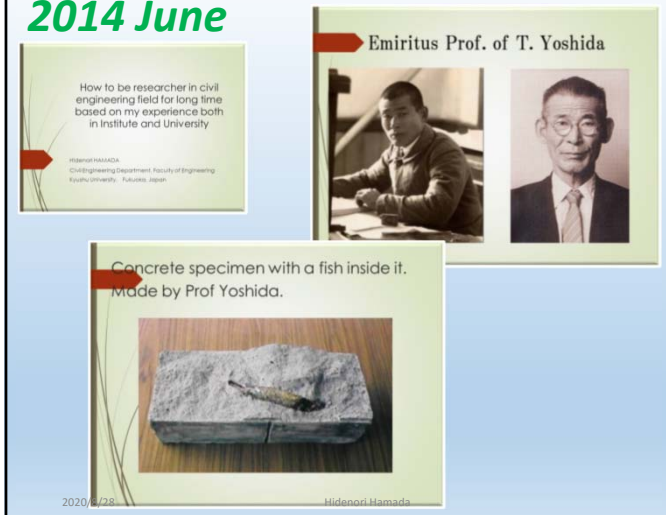


2014 June

How to be researcher in civil engineering field for long time based on my experience both in Institute and University

Hidenori HAMADA
Civil Engineering Department, Faculty of Engineering
Kyushu University, Fukuoka, Japan

2014 June



2017 March

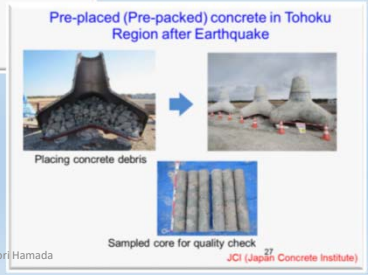
Seawater *Utilization for concrete production*

– JCI Committee Report –

Hidenori Hamada
（濵田　秀則）

Kyushu University,
Fukuoka, Japan

1



Research Career (Hidenori Hamada)

April 1986 – March 2006 (20 years)

PHRI (Port and Harbour Research Institute)

PARI (Port and Airport Research Institute)

October 1992 – September 1993 (1 year)

University of Sheffield, England, U.K.

Prof. R. Narayan Swamy

April 2006 – September 2009 (3.5 years)

Kyushu University (Associate Professor)

October 2009 – August 2020 (almost 12 years)

Kyushu University (Professor)

Research Career (Hidenori Hamada)

April 198

PHRI

PARI

Octobe

Univ

April 200

Kyush

October 2

Prof. R. Narayan Swamy

Kyushu University (Professor)

Contribution History by Asian (overseas) Students - in concrete labo. of Kyushu Univ. -

year	Dr. degree	Master degree
2013	**Dr. Rita Irmawaty**: A Study on Long-term Performance of Concrete over 50MPa in Compressive Strength.	**Mr. Amry Dasar**: A Study on Corrosion Evaluation of Steel Reinforced Concrete Due to Chloride Ion.
2014	**Dr. Nurazuwa Binti Md. Noor**: Physical Performance and Durability Evaluation of Rubberized Concrete.	
2015	**Dr. Adiwijaya**: A Fundamental Study on Sea-water Mixed Concrete Related to Strength, Carbonation and Alkali Silica Reaction. **Dr. Muhammad Akbar Caronge**: A Study on the Effectiveness of Cathodic Protection for Steel Bars in Concrete Structures.	
2016	**Dr. Mohd Isneini**: A Study on ASR Expansion Mitigation by Mineral Admixtures and LiOH-H_2O.	**Mr. Inamullah**: A Study on Durability Enhancement Against Carbonation of Concrete Structures in Afghanistan.

Contribution History by Asian (overseas) Students - in concrete labo. of Kyushu Univ. -

year	Dr. degree	Master degree
2016	**Dr. Rahmita Sari Rafdinal**: Life-extension of RC Structure by Cathodic Protection Using Zinc Sacrificial Anode Embedded in Concrete.	
2017	**Dr. Amry Dasar**: A Study on Deterioration and Corrosion Behaviour of RC and PC Members with Initial Defects under Environmental Action.	
2018		**Ms. Zeinab Okasha**: Corrosion Evaluation in Carbonated and Chloride Permeated Concrete Exposed under Different Conditions.
2019	**Dr. Dahlia Patah**: A Study on Corrosion Evaluation of Steel Reinforcement in Concrete During Initiation and Propagation Stage Due to Chloride Attack.	**Ms. Sabrina Harahap**: A Study on Corrosion Behavior of Steel Reinforcement in Sea-water Mixed Concrete and Application of Corrosion Prevention: Corrosion Inhibitor and Cathodic Protection.

Contribution History by Asian (overseas) Students - in concrete labo. of Kyushu Univ. -

year	Dr. degree	Master degree
2020	**(Dr.) Ms. Pinta Astuti**: A Study on Repair Strategy of Severely Damaged RC Structures by Using Sacrificial Anodes Cathodic Protection.	**Ms. Caiyun Xie**: A Study on Effectiveness of Bleeding Phenomena on Internal Structure and Corrosion of Reinforcing Steel Bar in Mortar. **Ms. Zhang Yichen**: Effect of Curing on Durability of Concrete Using Metakaolin-containing Artificial Pozzolan. **Mr. Loke Yen Theng**: Comparative Study on Durability of 150MPa Ultra-High Performance Fiber Reinforced Concrete (UHPFRC) Member with Cracks under Chloride Environment.
2021 scheduled	**Mr. Youn Byong-Don**: A Study on the Carbonation Service Life Prediction of Existing Underground Reinforced Concrete Structures Using Artificial Intelligence. **Ms. Volana Andoriamisa**:	**Ms. Khalilah Kamarulzaman**:

Contribution History by Asian (overseas) Students
- in concrete labo. of Kyushu Univ. -

year	Dr. degree	Master degree
2013	**Dr. Rita Irmawaty**: A Study on Long-term Performance of Concrete over 50MPa in Compressive Strength.	**Mr. Amry Dasar**: A Study on Corrosion Evaluation of Steel Reinforced Concrete Due to Chloride Ion.
2014	**Dr. Nurazuwa Binti Md. Noor**: Physical Performance and Durability Evaluation of Rubberized Concrete.	
2015	**Dr. Adiwijaya**: A Fundamental Study on Sea-water Mixed Concrete Related to Strength, Carbonation and Alkali Silica Reaction. **Dr. Muhammad Akbar Caronge**: A Study on the Effectiveness of Cathodic Protection for Steel Bars in Concrete Structures.	
2016	**Dr. Mohd Isneini**: A Study on ASR Expansion Mitigation by Mineral Admixtures and LiOH-H_2O.	**Mr. Inamullah**: A Study on Durability Enhancement Against Carbonation of Concrete Structures in Afghanistan.

Contribution History by Asian (overseas) Students
- in concrete labo. of Kyushu Univ. -

year	Dr. degree	Master degree
2016	**Dr. Rahmita Sari Rafdinal**: Life-extension of RC Structure by Cathodic Protection Using Zinc Sacrificial Anode Embedded in Concrete.	
2017	**Dr. Amry Dasar**: A Study on Deterioration and Corrosion Behaviour of RC and PC Members with Initial Defects under Environmental Action.	
2018		**Ms. Zeinab Okasha**: Corrosion Evaluation in Carbonated and Chloride Permeated Concrete Exposed under Different Conditions.
2019	**Dr. Dahlia Patah**: A Study on Corrosion Evaluation of Steel Reinforcement in Concrete During Initiation and Propagation Stage Due to Chloride Attack.	**Ms. Sabrina Harahap**: A Study on Corrosion Behavior of Steel Reinforcement in Sea-water Mixed Concrete and Application of Corrosion Prevention: Corrosion Inhibitor and Cathodic Protection.

Contribution History by Asian (overseas) Students
- in concrete labo. of Kyushu Univ. -

year	Dr. degree	Master degree
2020	**(Dr.) Ms. Pinta Astuti**: A Study on Repair Strategy of Severely Damaged RC Structures by Using Sacrificial Anodes Cathodic Protection.	**Ms. Caiyun Xie**: A Study on Effectiveness of Bleeding Phenomena on Internal Structure and Corrosion of Reinforcing Steel Bar in Mortar. **Ms. Zhang Yichen**: Effect of Curing on Durability of Concrete Using Metakaolin-containing Artificial Pozzolan. **Mr. Loke Yen Theng**: Comparative Study on Durability of 150MPa Ultra-High Performance Fiber Reinforced Concrete (UHPFRC) Member with Cracks under Chloride Environment.
2021 scheduled	**Mr. Youn Byong-Don**: A Study on the Carbonation Service Life Prediction of Existing Underground Reinforced Concrete Structures Using Artificial Intelligence. **Ms. Volana Andoriamisa**:	**Ms. Khalilah Kamarulzaman**:

Grouping of “research interest”

1. Deterioration mechanism,
2. Long term exposure test (evaluation)
3. Seawater concrete,

• Rita-san, Nurazuwa-san, Adiwijaya-san, Isneini-san, Amry-san, Lia-san, Inamullah-san, Zeinab-san, Sabrina-san, Xie-san Zhang-san, Loke-san,

4. Cathodic protection

• Akbar-san, Sari-san, Pinta-san, Sabrina-san,

Innovation

- **Innovation** in its modern meaning is "a new idea, creative thoughts, new imaginations in form of device or method".
- Innovation is related to, but not the same as, invention.
- Innovation is a "**New combination or new connection**" which create new idea, unknown results.

What is "originality" in research ?

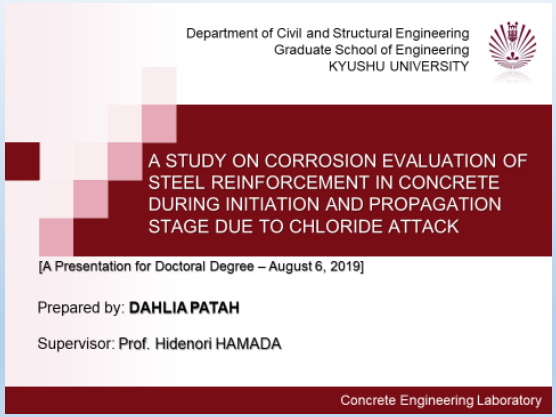
Professor of Kyoto University

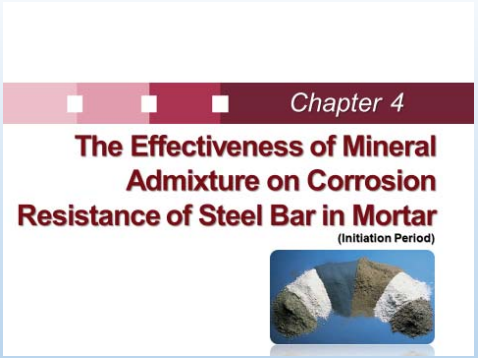
Novel Prize Winner in Chemistry

Dr. Kenichi Fukui

Originality is … to look at or think a "fact", "phenomenon", etc. by new way, which nobody did nor nobody could find…

An Example : from Lia-sans' research





Chapter 4

The Effec
Admi
Resistance of

Chloride Threshold Value (CTV)

Actual structure & service life estimation

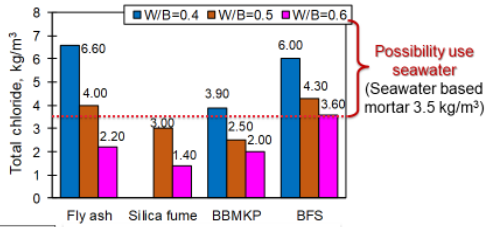


Fig 4.22 Minimum CTV for total chloride

Based on CTV, it is quite resistance to seawater. There is possible to use seawater if concrete is mixed with BFS and fly ash with maximum W/B ratio of 0.5

Chapter 4

The Effectiveness of Mineral Admixture on Corr
Resistance of Steel Bar in M

Chloride Threshold Value (CTV)

Actual structure & service life estimation

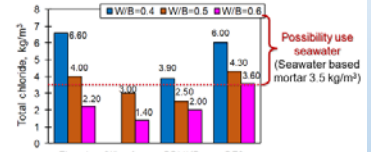


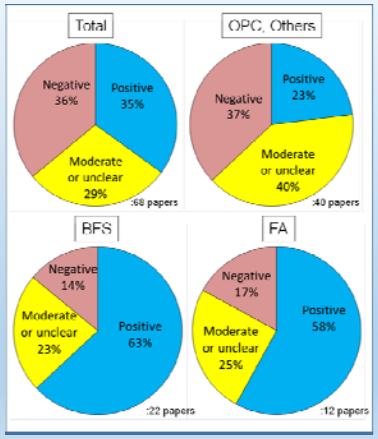
Fig 4.22 Minimum CTV for total chloride

Based on CTV, it is quite resistance to seawater. There is possible to use seawater if concrete is mixed with BFS and fly ash with maximum W/B ratio of 0.5

Seawater concrete could be made with adequate mineral admixtures !!

Literature review on seawater mixed concrete

By T Nishida (P. A. R. I.)



New connection ! Innovation !!

Lia-sans' experiment

Nishida-sans' research (Literature survey)

Seawater concrete (material design)

An Example : from Pinta-sans' research

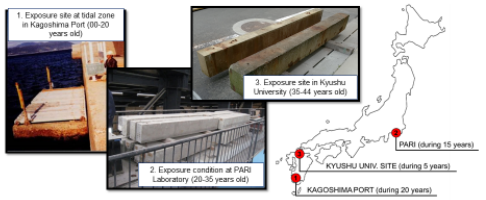
A study on repair strategy of severely damaged RC structures by using sacrificial anode cathodic protection

Presentation for doctoral public hearing
July 14th, 2020

Prepared by : PINTA ASTUTI
Supervisor : Professor Hidenori HAMADA

九州大学 KYUSHU UNIVERSITY

CASE STUDY ON 44-YEARS DETERIORATED RC BEAM STRUCTURES



OBJECTIVE

To determine **repair method** of deteriorated RC beams by using SACP to extend its service life until **70 years in air.**

CASE STUDY ON 44-YEARS DETERIORATED RC BEAM STRUCTURES

OBJECTIVE

To determine repair method of deteriorated RC beams by using SACP to extend its service life until 70 years in air.

Environmental improvement of rebar

Rest potential development	TIME DEPENDENT	Depolarization development
1-month		1-month
3-months		3-months
6- months		6- months
9- months		9- months
12- months		12- months
15- months		15- months
18- months		18- months
21- months		21- months

Remark: 90% No corrosion | Uncertain | Corrosion

Remark: On protection | No protection

Repair method D is the most effective repair method

CASE STUDY ON 44-YEARS DETERIORATED RC BEAM STRUCTURES

OBJECTIVE

To determine repair method of deteriorated RC beams by using SACP to extend its service life until 70 y

Environmental improvement of rebar

Rest potential development	TIME DEPENDENT	Depolarization development
1-month		1-month
3-months		3-months
6- months		6- months
9- months		9- months
12- months		12- months
15- months		15- months
18- months		18- months
21- months		21- months

Remark: 90% No corrosion | Uncertain | Corrosion

Remark: On protection | No protection

Repair method D is the most effective repair method

九州大学 Chapter 4 29

Corrosion prevention by current flow !!

New connection ! Innovation !!

Akbar-sans' research → Sari-sans' research → Pinta-sans' research → **Khalilah-sans' research**

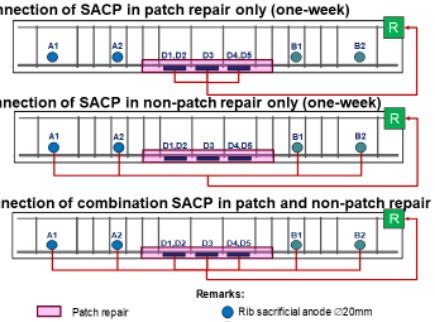
Corrosion prevention by current flow !!
(ex. for Seawater concrete)

2020/8/28 Hidenori Hamada

B. SAME TIME APPLICATION OF DIFFERENT KIND OF SACP

Connection pattern

1. Connection of SACP in patch repair only (one-week)
2. Connection of SACP in non-patch repair only (one-week)
3. Connection of combination SACP in patch and non-patch repair

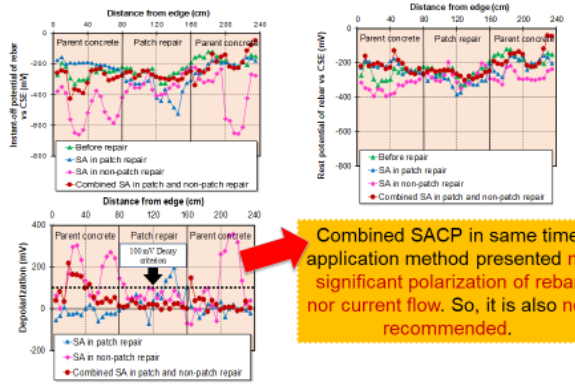


九州大学 Chapter 4 24

2020/8/28 Hidenori Hamada

B. SAME TIME APPLICATION OF DIFFERENT KIND OF SACP

Potential development of rebar



Combined SACP in same time application method presented no significant polarization of rebar nor current flow. So, it is also not recommended.

2020/8/28 九州大学 Chapter 4 25 Hidenori Hamada

B. SAME TIME APPLICATION OF DIFFERENT KIND OF SACP

Connection pattern

Potential development of rebar

Anyone who has never made a mistake has never tried anything new.

Albert Einstein

"Failure" but "new knowledge" !

2020/8/28 Hidenori Hamada

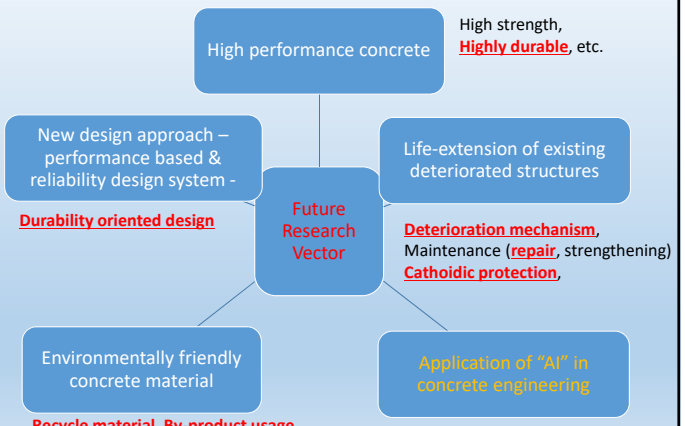
Dr. Rita Irmawaty:

A Study on Long-term Performance of Concrete over 50MPa in Compressive Strength

January 2013

https://catalog.lib.kyushu-u.ac.jp/opac_search/?opkey=B159669677669957&lang=0&amode=23&place=&list_disp=20&list_sort=0&fc_val=c_string_disser_degree%23%40%23300&fc_val=fauth%23%40%23Irmawaty%2C%20Rita&cmode=0

Concrete research – present and future --



As Acknowledgement !!

- ***Present faculty member of Concrete Labo. of Kyushu University***.

- Dr. Hidenori HAMADA (Prof.)
- Dr. Yasutaka SAGAWA (Associate Prof.)
- Dr. Takayuki FUKUNAGA (Assistant Prof.) ***new member***
- Dr. Daisuke YAMAMOTO (Technical Officer)

Hope to see you again directly !!
after present disaster/pandemic.

2020 August

What is Innovation ? Originality ?
in Concrete Engineering / Research

- Contributions and Collaborations of Foreign Students in Concrete Labo. in Kyushu University

Thank you very much for your kind attention.

Hidenori Hamada
濵田　秀則

Dr. Rita Irmawaty:

A Study on Long-term Performance of Concrete over 50MPa in Compressive Strength

January 2013

https://catalog.lib.kyushu-u.ac.jp/opac_search/?opkey=B159669677669957&lang=0&amode=23&place=&list_disp=20&list_sort=0&fc_val=c_string_disser_degree%23%40%23300&fc_val=fauth%23%40%23Irmawaty%2C%20Rita&cmode=0

Dr. Nurazuwa Binti Md. Noor

Physical Performance and Durability Evaluation of Rubberized Concrete

September 2014

https://catalog.lib.kyushu-u.ac.jp/opac_search/?opkey=B159669687686419&lang=1&amode=23&place=&list_disp=20&list_sort=0&fc_val=fauth%23%40%23Nurazuwa%2C%20Binti%20Md%20Noor&cmode=0

Dr. Adiwijaya

A Fundamental Study on Sea-water Mixed Concrete Related to Strength, Carbonation and Alkali Silica Reaction

September 2015

https://catalog.lib.kyushu-u.ac.jp/opac_search/?lang=0&appname=Netscape&version=5&sort_exp=6&disp_exp=20&amode=2&cmode=0&schemaid=823&brwflg=1&flflg=&smode=0&kywd=Adiwijaya

Dr. Muhammad Akbar Caronge

A Study on the Effectiveness of Cathodic Protection for Steel Bars in Concrete Structures

September 2015

https://catalog.lib.kyushu-u.ac.jp/opac_search/?opkey=B159669700547803&lang=1&amode=23&place=&list_disp=20&list_sort=0&fc_val=fauth%23%40%23%E3%82%A2%E3%82%AF%E3%83%90%E3%83%AB%20%E3%83%81%E3%83%A3%E3%83%AD%E3%83%8B%2C%20%E3%83%A0%E3%83%8F%E3%83%9E%E3%83%89&cmode=0

Dr. Mohd Isneini

A Study on ASR Expansion Mitigation by Mineral Admixtures and LiOH-H_2O

July 2016

https://catalog.lib.kyushu-u.ac.jp/opac_search/?opkey=B159669706989820&lang=1&amode=23&place=&list_disp=20&list_sort=0&fc_val=fauth%23%40%23Isneini%2C%20Mohd&cmode=0

2020/8/28 Hidenori Hamada

Dr. Rahmita Sari Rafdinal

Life-extension of RC Structure by Cathodic Protection Using Zinc Sacrificial Anode Embedded in Concrete

August 2016

https://catalog.lib.kyushu-u.ac.jp/opac_download_md/1785399/eng2599.pdf

2020/8/28 Hidenori Hamada

Dr. Amry Dasar

A Study on Deterioration and Corrosion Behaviour of RC and PC Members with Initial Defects under Environmental Action

August 2017

https://catalog.lib.kyushu-u.ac.jp/opac_download_md/1866287/eng2684.pdf

2020/8/28 Hidenori Hamada

Dr. Dahlia Patah

A Study on Corrosion Evaluation of Steel Reinforcement in Concrete During Initiation and Propagation Stage Due to Chloride Attack

September 2019

https://catalog.lib.kyushu-u.ac.jp/opac_download_md/2534439/eng2908.pdf

2020/8/28 Hidenori Hamada

(Dr.) Ms. Pinta Astuti

A Study on Repair Strategy of Severely Damaged RC Structures by Using Sacrificial Anodes Cathodic Protection

(September 2020)

Mr. Amry Dasar

A Study on Corrosion Evaluation of Steel Reinforced Concrete Due to Chloride Ion

August 2013

Mr. Inamullah

A Study on Durability Enhancement Against Carbonation of Concrete Structures in Afghanistan

March 2016

Ms. Zeinab Okasha

Corrosion Evaluation in Carbonated and Chloride Permeated Concrete Exposed under Different Conditions

March 2018

Ms. Sabrina Harahap

A Study on Corrosion Behavior of Steel Reinforcement in Sea-water Mixed Concrete and Application of Corrosion Prevention: Corrosion Inhibitor and Cathodic Protection

September 2019

Ms. Caiyun Xie

A Study on Effectiveness of Bleeding Phenomena on Internal Structure and Corrosion of Reinforcing Steel Bar in Mortar

March 2020

Ms. Zhang Yichen

Effect of Curing on Durability of Concrete Using Metakaolin-containing Artificial Pozzolan

March 2020

Mr. Nguyen Long

A Study on the Effectiveness of Hybrid Cathodic Protection for Steel Bar in Reinforced Concrete Structures

September 2019