

REFERENCES

- [1] Adhikarinayake, S.R., Gayan, K.D.J.A., Thathsarani, N.G.T.T., Gamage, J.C.P.H. 2012 ‘Performance of epoxy adhesive bond between CFRP and concrete’, *Proceedings of SAIM research symposium on Engineering advancements*, pp 97-99
- [2] Ceroni, F., Cosenza, E., Gaetano, M., Pecce, M. 2006 ‘Durability issues of FRP rebars in reinforced concrete members’, *Cement and Concrete Composites*, vol.28, no.10, pp. 857-868
- [3] Adhikarinayake, S.R., Gayan, K.D.J.A., Thathsarani, N.G.T.T., Gamage, J.C.P.H. 2012 ‘Investigation on alternative bonding agents for CFRP concrete composites’, *Proceedings of International conference on Structural and Built Environment (ICSBE2012)*
- [4] Mofidi, A., Chaallal, O. 2010 ‘Shear strengthening of RC beams with EB FRP: Influencing factors and conceptual debonding model’, *Journal of Composites for Construction*, vol.15
- [5] Chen, J.F., Teng, J. 2003 ‘Shear capacity of FRP-strengthened RC beams: FRP debonding’, *Construction and Building Materials*, vol.17, pp. 27-41
- [6] Cao, S., Chen, J., Teng, J., Hao, Z., Chen, J., 2005 ‘Debonding in RC beams shear strengthened with complete FRP wraps’, *Journal of Composites for Construction*, vol.9
- [7] Irwin, R., Rahman, A., 2002 ‘FRP Strengthening of concrete structures - design constraints and practical effects on construction detailing’
- [8] Grace, N.F., Singh, S.B., 2005 ‘Durability evaluation of carbon fiber-reinforced polymer strengthened concrete beams: experimental study and design’, *Aci Structural Journal*
- [9] Saito, M. 2002 ‘carbon fiber composites in the japanese civil engineering market—conventional uses and developing products’, *Sampe Journal*, vol. 38, pp. 20-25
- [10] Najafi, J. 2017 ‘Impact of Professor Urs Meier in application of CFRP composites in structural strengthening in Iran’, *Proceedings of Forth Conference on Smart Monitoring, Assessment and Rehabilitation of Civil Structures (SMAR 2017)*
- [11] Khan, A.U.R.K., Baluch, M. H., Al-Gadhib, A. H. 2004 ‘Repair and strengthening of reinforced concrete structures using CFRP plates’, *Proceedings*

*of International Bhurban Conference on Applied Sciences & Technology
(IBCAST 2004)*

- [12] Luyckx, J., “Carbon fiber composites in civil engineering”
- [13] *Advantages and Disadvantages of Carbon Fibre Reinforcement Polymer*, StudyMoose, viewed 28 June 2022, < <https://studymoose.com/advantages-and-disadvantages-of-carbon-fibre-reinforcement-polymer-essay>>
- [14] ACI Committee 440, 2017 *ACI Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures*
- [15] Zhu, J., Zheng, W.Z., Leng, Y.F., Qin, C.Z., and Xu, Z.Z., 2017 ‘Research on the bond anchorage properties of alkali-activated slag cementitious material’, *Proceedings of IOP Conference Series Materials Science and Engineering*
- [16] *Advantages and disadvantages of CFRP reinforced concrete beam bridge*, HORSE, viewed 28 June 2022, <<https://www.horseen.com/project/advantages-disadvantages-cfrp-reinforced-concrete-beam-bridge?page=10>>
- [17] Wu, Z., Yuan, H., Niu, H., 2002 ‘Stress transfer and fracture propagation in different kinds of adhesive joints’, *Journal of Engineering Mechanics*, vol.128, no.5
- [18] Gamage, J.C.P.H., Al-Mahaidi, R. and Wong, M.B., 2005 ‘Bond characteristics of cfrp plated concrete members under elevated temperatures’, *Proceedings of International Conference of Composite Structures (ICCS/13)*
- [19] Araghi, H.J., Nikbin, I.M., Reskati, S.R., Rahmani, E., Allahyari, H. ‘An experimental investigation on the erosion resistance of concrete containing various PET particles percentages against sulphuric acid attack’, *Construction and Building Materials*, vol.77, pp. 461-471
- [20] Lau, D., Büyüköztürk, O. 2010 ‘Fracture characterization of concrete/epoxy interface affected by moisture’, *Mechanics of Materials*, vol.42, pp. 1031-1042
- [21] Lau, D. ‘Adhesion between organic and inorganic materials at nanoscale under the effect of moisture’
- [22] Dai, J. G., Yokota, H., Iwanami, M., Ka, E. 2010 ‘Experimental investigation of the influence of moisture on the bond behaviour of FRP to concrete interfaces’, *Journal of Composites for Construction*, vol.14
- [23] González, J.C.L., Gómez, J. F., Valle, E. G. 2012 ‘Effect of adhesive thickness and concrete strength on FRP–concrete bonds’, *Journal of Composites for Construction*, vol.16

-
- [24] Karbhari, V.M., 2007 '*Durability of composites for civil structural applications*'
- [25] Marouani, S., Curtil, L., Hamelin, P. 2018 'Composites realized by hand lay-up process in a civil engineering environment: initial properties and durability', *Materials and Structures*, vol.41, no.5, pp. 831-851
- [26] Pan, Y., Xian, G., Silva, M.A.G. 2015 'Effects of water immersion on the bond behaviour between CFRP plates and concrete substrate', *Construction and Building Materials*, vol.101, pp.326-337
- [27] Benzarti, K., Quiertant, M., Aubagnac, C., Chataigner, S., Nishizaki, I., Kato, Y., 2009 'Durability of CFRP strengthened concrete structures under accelerated or environmental ageing conditions', *Proceedings of Conference Concrete Repair, Rehabilitation and Retrofitting II*
- [28] Au, C., Büyüköztürk, O. 2006 'Peel and shear fracture characterization of debonding in FRP plated concrete affected by moisture', *Journal of Composites for Construction*, vol. 10, no. 1
- [29] Buyukozturk, O., Hearing, B. 1998 'Failure behaviour of pre-cracked concrete beams retrofitted with FRP', *Journal of Composites for Construction*
- [30] Ouyang, Z., Wan, B.L. 2007 'Experimental and numerical study of moisture effects on the bond fracture energy of FRP/concrete joints', *Journal of Reinforced Plastics and Composite*, vol.27, no.2
- [31] Buyukozturk, O., Gunes, O., Karaca, E. 2004 'Progress on understanding debonding problems in reinforced concrete and steel members strengthened using FRP composites', *Construction and Building Materials*, vol.18, no.1
- [32] Mostofinejad D, Mahmoudabadi E., 2010 'Grooving as alternative method of surface preparation to postpone debonding of FRP laminates in concrete beams', *Journal of Composites for Construction*, vol. 14, no.6
- [33] Hosseini, A., Mostofinejad, D. 2013 'Experimental investigation into bond behaviour of CFRP sheets attached to concrete using EBR and EBROG techniques', *Composites Part B: Engineering*, vol.51, pp.130-139
- [34] David E., Neuner, J.D. 2001 'Environmental Durability Studies for FRP Systems: Definitions of Normal Conditions of Use of FRP for Structural Strengthening Applications', *Proceedings of the International Conference on FRP Composites in Civil Engineering*. pp.1551-1558
- [35] Karbhari, V.M., Engineer, M. 1996 'Effect of Environmental Exposure on the External Strengthening of Concrete with Composites-Short Term Bond Durability', *Journal of Reinforced Plastics and Composite*, vol.15, no.12

-
- [36] Gokhan Sakar, 2008 ‘Shear strengthening of RC beams subjected to cyclic load using CFRP strips’, *Advanced Composites Letters*, vol. 17, no. 6
- [37] ACI PRC-440-07 2007 ‘Report on Fiber-Reinforced Polymer (FRP) Reinforcement for Concrete Structures’
- [38] Darby, A., Ibell, T., Clarke, J. 2004 ‘TR 55 Design guidance for strengthening concrete structures using fibre composite materials’
- [39] Redouan El Ghadioui, Dominik Hiesch, Lukas Bujotzek, Tilo Proske, Carl-Alexander Graubner, “Structural behaviour of CFRP reinforced concrete members under monotonic and cyclic long-term loading”
- [40] Ching, A. 2005 ‘Moisture Degradation in FRP Bonded Concrete Systems: An Interface Fracture Approach’
- [41] Ferrier, E., Agbossou, A. ‘Temperature effects on the shear capacity of external bonded fiber reinforced polymer on concrete’, *Construction and Building Materials*, vol.152, pp.333-344
- [42] Juska, T., Dutta, P., Carlson, L., Weitsman, J. ‘Thermal Effects, Gap Analysis for Durability of Fiber Reinforced Polymer Composites in Civil Infrastructure’
- [43] Chin, J., Haight, M., Hughes, W., Nguyen, T. 1998 ‘Environmental effects on composite matrix resins used in construction’ *Proceedings of CDCC* pp.229-242
- [44] Amine, M.S., Tanks, J., Harris, D.K., Head, M., 2015 ‘Environmental Effects on Material and Bond Durability of CFRP and AFRP for Prestressed Concrete Bridge Applications’, *Proceedings of Structures Congress 2015*
- [45] Hao, X., Xian, G., Huang, X., Xin, M., Shen, H. 2015 ‘Effects of Adhesive Coating on the Hygrothermal Aging Performance of Pultruded CFRP Plates’
- [46] Mohammadi, M., Mostofinejad, D., Barghian, M., 2017 ‘Alkali and temperature long-term effect on the bond strength of fiber reinforced polymer-to-concrete interface’, *Journal of Composite Materials*, vol.52, no.15
- [47] Benmokrane, B., Faza, S., Gangarao, H.V.S., Karbhari, V.M., Porter, M., ‘Effects of Alkaline Environment, Gap Analysis for Durability of Fiber Reinforced Polymer Composites in Civil Infrastructure’
- [48] Ojha, P., Pandey, P., Karstensen, K.H., Saha, P.K. 2020 ‘Utilization of Construction and Demolition (C&D) Waste and Industrial Inorganic Wastes in Cement Manufacturing, Springer, Urban Mining and Sustainable Waste Management’

-
- [49] Yuan, H., Dangla, P., Chatellier, P., Chaussadent, T. 2013 'Degradation modelling of concrete submitted to sulphuric acid attack', *Cement and Concrete Research*, vol.53, pp.267-277
- [50] Hadigheh, S.A., Gravina, ., R.J., Smith, S.T., 2017 'Effect of acid attack on FRP-to-concrete bonded interfaces' *Construction and Building Materials*, vol.152, pp. 285-303
- [51] Nnadi, E.O., Marriaga, J.L. 2013 'acid corrosion of plain and reinforced concrete sewage systems', *Journal of Materials in Civil Engineering*, vol.25, no.9, pp.1353-1356
- [52] Ji, Y., Kim, Y.J., Jia, Y. 2021 'Performance characterization of plain and CFRP-bonded concrete subjected to sulfuric acid', *Materials and Design*, vol.197, no.2
- [53] Yingwu, Z., Zhiheng, F., Jia, U. 2015 'Bond behaviour of FRP-to-concrete interface under sulphate attack: an experimental study and modelling of bond degradation', *Construction and Building Materials*
- [54] Taljsten, B. 1997 'Defining anchor lengths of steel and CFRP plates bonded to concrete', *International Journal of Adhesion and Adhesives*, vol.17, no.4, pp.319-327
- [55] ACI 440L. (2005). 'Durability of fiber reinforced polymer (FRP) composites used with concrete', American Concrete Institute (ACI), Committee 440, Draft Report.
- [56] Fawzia, S., Kabir, M.H., 2012 'A Review on environmental durability of CFRP strengthened system', *Proceedings of the Australasian Structural Engineering Conference 2012*, pp. 1-8.
- [57] Yongcheng, Ji., Yail, J., Kim, M.ASCE., 2017 'Effects of Sulfuric Acid on Durability Characteristics of CFRP Composite Sheets', *Journal of Materials in Civil Engineering*, vol.29, no.10.
- [58] Davis, J. L., Nica, D., Shields, K., Roberts, D.J. 1998 'Analysis of concrete from corroded sewer pipe', *International Biodeterioration & Biodegradation*, vol.42, no.1, pp. 75–84.
- [59] Ehrich, S., Helard, L., Letourneux, R., Willocq, J., Bock, E., 1999 'Biogenic and chemical sulphuric acid corrosion of mortars', *Journal of Materials in Civil Engineering*, vol.11, no. 4.
- [60] Vincke, E., Monteny, J., Beeldens, A., Belie, N., Taerwe, L., Gemert, D.V., Verstraete, W., 2000 'Recent developments in research on biogenic sulfuric acid attack of concrete', *Environmental technologies to treat sulfur pollution: principles and engineering*.

-
- [61] De Muynck, W., De Belie, N., Verstraete, W. 2009 ‘Effectiveness of admixtures, surface treatments and antimicrobial compounds against biogenic sulfuric acid corrosion of concrete’, *Cement Concrete Composite*, vol.31, no. 3, pp. 163–170
- [62] Kawai, K., Yamaji, S., Shinmi, T. 2005 ‘Concrete deterioration caused by sulphuric acid attack’, *International Conference On Durability of Building Materials and Components*.
- [63] Vincke, E., Verstichel, S., Monteny, J., Verstraete, W. 1999 ‘A new test procedure for biogenic sulphuric acid corrosion of concrete’, *Biodegradation*, vol.10, no.6, pp.421–428.
- [64] Schmidt, M., Hormann, K., Hofmann, F.J., Wagner, E., 1997 Betonmit erhöhtem Widerstand gegen Säure und Biogene Schwefelsäurekorrosion. *Concrete Precasting Plant Technol.* 4: 64–70
- [65] Mori, T., Nonaka, T., Tazaki, K., Koga, M., Hikosaka, Y., Noda, S. 1992 ‘Interactions of nutrients, moisture and pH on microbial corrosion of concrete sewer pipes’, *Water Research*, vol.26, no.1, pp. 29–37.
- [66] Yuan, H., Dangla, P., Chatellier, P., Chaussadent, T., 2013 ‘Degradation modelling of concrete submitted to sulphuric acid attack’, *Cement and Concrete Research*, vol.53, pp.267-277
- [67] Faisal, M.F.M., Hassan, A., Gan, K.W., Roslan, M.N., Rashid, A.H.A. 2020 ‘Effects of Sulphuric Acid Concentrations during Solvolysis Process of Carbon Fiber Reinforced Epoxy Composite’, *Sains Malaysiana*, vol.49, no.9, pp.2073-2081.
- [68] Ji, Y., Kim, Y. J., 2016 ‘Durability of Concrete Columns Protected by Sustainable Composite Sheets in an Acid Environment’, *Fourth International Conference on Sustainable Construction Materials and Technologies*.
- [69] Mori, T., Koga, M., Hikosaka, Y., Nonaka, T., Mishina, F., Sakai, Y., Koizumi, J., 1991 ‘Microbial corrosion of concrete sewer pipes, H₂S production from sediments and determination of corrosion rate’, *Water Science and Technology*, vol. 23, no. 7-9, pp.1275–1282
- [70] Sand, W., 1987 ‘Importance of hydrogen sulfide, thiosulfate and methylmercaptan for growth of Thiobacilli during simulation of concrete corrosion’, *Applied and Environmental Microbiology*, vol. 53, no.7, pp.1645–1648
- [71] Sand, W., Bock, E., White, D.C. 1987 ‘Bio test system for rapid evaluation of concrete resistance to sulfuroxidizing bacteria’, *Materials Performance*, vol.26, pp.14-17

-
- [72] Mori, T., Nonaka, T., Tazaki, K., Koga, M., Hikosaka, Y., Noda, S., 1992 'Interactions of nutrients, moisture and pH on microbial corrosion of concrete sewer pipes', *Water Resources*, vol.26, no.1, pp.29–37.
- [73] Silva, M.A.L., Gamage, J.C.P.H., Fawzia, S., 2019 'Performance of slab-column connections of flat slabs strengthened with carbon fiber reinforced polymers', *Case Studies in Construction Materials*, vol.11.
- [74] Kafodya, I., Xian, G., Li, H., 2015 'Durability study of pultruded CFRP plates immersed in water and seawater under sustained bending: Water uptake and effects on the mechanical properties', *Composites: Part B* 70, pp 138–148.
- [75] Xian, G., Karbhari, V.M., 2007 'Segmental relaxation of water-aged ambient cured epoxy', *Polymer degradation and stability*, vol. 92, no 9, pp. 1650-1659
- [76] Shanghai Horse Construction, 2019 'Product data sheet - HM-180C3P - high performance carbon fiber impregnated adhesive'
- [77] Marshall, J. M., Marshall, G. P., Pinzelli, R. F., 1982 'The diffusion of liquids into resins and composites', *Polymer composites*, vol. 3, no 3, pp. 131-137