ISSN: 0974-2115
www.jchps.com Journal of Chemical and Pharmaceutical Sciences

A review on application of fiber reinforced ferro-cement as a material for water tanks

J.R. Thirumal, J. Jayavelmurugan
Civil Engineering department, Bharath University, Selaiyur, Chennai 73
***Corresponding author: E-Mail: thirumal_jr@gmail.com**

ABSTRACT

Concrete based construction in structures had its inception from the early 19th century. Concrete, today being the predominant construction material has been employed in almost every component of a structure. Portland cement had a steady growth in production rate at 5 percentage per annum (Intergovernmental panel on climate change, IPCC, 2007). Portland cement is the single most contributor to the carbon emissions it's been estimated that 1 ton of cement is averaging to equal amounts of carbon di oxide the alarming rate causes a great apprehension in the minds of environmentalists and also growing concerns in the living community. There is also the risk of the resource depletion in an exponential rate due to the rapid urbanization throughout the world with concert as their major component. Amongst the hothouse gas, Co_2 contributes about sixty five percentage of worldwide warming (National Oceanic and Atmospheric Administration, 2010). CO_2 has been released excessively during the production of OPC owing to calcinations of limestone and incineration of relic petroleum is approximately at the rate of tonne for each tonne of Ordinary Portland Cement manufactured. Though the application of Portland cement in construction is inevitable there has been varied efforts made to find an alternative to the crisis arising based upon its usage. Sustainability means to show continuous progress Moreover, due to owing to the non –homogeneity in concrete it's hard to make it sustainable and repairing becomes cumbersome.

KEY WORDS: Fiber, Ferro-Cement, Water Tanks.

1. INTRODUCTION

Due to the growing environmental concerns there is an immediate need to find an alternative building material which also comply ti the structural requirements and has better service with less cost. This effort led to development of new innovative sustainable construction material ferrocement which reduces usage of these materials significantly.

Ferrocement for avoiding waterproofing and rehabilitation: The sustainability is obtained totally by use of ferrocement. Ferrocement is a multi-sustainable water proofing crack resistance material. At the same time there shall not be any spalling, deterioration, attack of atmospheric gases, carbonation and corrosion of reinforcement. The ferrocement shall be the shield against all these negative aspects of reinforced cement concrete. As such the durability shall be increased to a great extent and it will not be necessary to carry out Repairs rehabilitation as well as waterproofing treatment of RCC structures during its life time.

Ferro cement mortar: The material used is a composite material, the binder must also further be mixed with sand having the sieve size range less than 1.18mm.admixtures are another addition which must be added in order to improve the non-corrosiveness and offer less porosity (Ferrocement Model Code).

The mix proportion for ferro cement based concrete should also suit the standard mixing criteria which suits the standard mix preparation of the reinforced cement concrete mix. The ferrocement technology has advanced so much that now it is possible to construct any structure with ferrocement for which R.C.C has been used. It saves valuable resources reducing the cost and time of construction and is eco-friendly.

History of Ferro cement: The development of ferrocement technology began in the 1840s with Lambot, who constructed a rowing boat using a composite of wires and cement. At the same time others were developing conventional reinforced concrete. Further development of ferrocement did not occur until the beginning 1943 when Pier Luigi Nervi rejuvenate the true ferrocement perception. The development of ferrocement technology has primarily been done in the boat building industry although ferrocement has successfully been used for many other applications such as roof systems and silos (ACI Manual of Concrete Practice).

Ferrocement obtained ample acknowledgement on the onset of early 1962 in U K, kiwis land, Australia. In 1965, an U.S –controlled ferrocement catch constructed in New Zealand, the 16m Awahnee, travelled throughout the globe a couple of times not undergoing primal hinderance, although it faced many hurdles.

In 1958, the expertise then reached soviet nations by the building of a number of structural elements. One such Illustration is a ferrocement vault of seventeen meter spans in the metro station of Leningrad, the interiors of the hall were made of ferrocement parts. Among recent times constructed ferrocement buildings includes the Opera House of sydney, established in 1973. As surfacing material on the vaults Ferrocement tiles have been employed in the house of opera, at a major arts centre in Sydney. Various buildings and mosques were constructed in India and Indonesia as well.

In this chapter, we studied out by the various investigators on the flexure, impact, durability/corrosion, properties of ferrocement. Fibrous ferrocement, applications of ferrocement etc.., are summarized and presented.

Inference of this study: This research finding will encourage the use of the new approach to produce lightweight thin ferrocement water tank (i.e. thickness in the order of 10-50mm) (Naaman, 2000) and evaluate its compatibility of using PVC mesh and high strength of the mortar from the mortar study. Since corrosion is more evident and severe in ferrocement, and dependent on type/ composition of cement used, grading of sand, composition of cement mortar, minimum cover to reinforcement, casting processes including compaction, PVC mesh reinforcement, water proofing methods and construction practices (Shanaang, 2008).

REFERENCES

Naaman A.E, Ferrocement and Laminated Cementitious Composites, Techno Press 3000, Ann Arbor, Michigan, USA, 2000.

ACI committee 549-1R-8 and 1R-93, Guide for The Design, Construction and Repair of Ferrocement, ACI 549-1R-8 and 1R-93, in manual of concrete practice, American concrete institute, Farmington Hills, Michigan, 1988, 27.

Udayakumar R, Khanaa V, Saravanan T, Saritha G, Cross layer optimization for wireless network (WIMAX), Middle - East Journal of Scientific Research, 6 (12), 2013, 1786-1789.

Kumaravel A, Rangarajan K, Algorithm for automaton specification for exploring dynamic labyrinths, Indian Journal of Science and Technology, 6 (5), 2013, 4554-4559.

Khanaa V, Thooyamani K.P, Udayakumar R, Cognitive radio based network for ISM band real time embedded system, Middle - East Journal of Scientific Research, 6 (12), 2013, 1798-1800.

Khanaa V, Mohanta K, Saravanan T, Comparative study of uwb communications over fiber using direct and external modulations, Indian Journal of Science and Technology, 6 (6), 2013, 4845-4847.

Kumaravel A, Pradeepa R, Efficient molecule reduction for drug design by intelligent search methods, International Journal of Pharma and Bio Sciences, 4 (2), 2013, B1023-B1029.

Sachithanantham P, Sa Nkaran S, Elavenil S, Experimental study on the effect of rise on shallow funicular concrete shells over square ground plan, International Journal of Applied Engineering Research, 10 (20), 2015, 41340-41345.

Brindha G, Krishnakumar T, Vijayalatha S, Emerging trends in tele-medicine in rural healthcare, International Journal of Pharmacy and Technology, 7 (2), 2015, 8986-8991.

Vanangamudi S, Prabhakar S, Thamotharan C, Anbazhagan R, Dual fuel hybrid bike, Middle - East Journal of Scientific Research, 20 (12), 2014, 1819-1822, 2014.

ACI committee 549, state of the art report on ferrocement, ACI 549 R-97, in manual of concrete practice, American concrete institute, Farmington Hills, Michigan, 1997, 26.

Ferrocement Model Code – building code recommendations for ferrocement (IFS 10-01) reported by IFS committee 10, published by International Ferrocement Society, Asian Institute Of Technology, International Ferrocement Information Centre, Thailand January 2001.

Akhtar S, Arif M and Quraishi M.A, Use of Chemical Corrosion Inhibitors for Protection of Metallic Fibre Reinforcement in Ferrocement Composites, The Arabian Journal for Science and Engineering, 34 (2), 2009, 105-113.

Anbazhagan R, Satheesh B, Gopalakrishnan K, Mathematical modeling and simulation of modern cars in the role of stability analysis, Indian Journal of Science and Technology, 6 (5), 2013, 4633-4641.

Sharmila S, Jeyanthi Rebecca L, Das M.P, Production of Biodiesel from Chaetomorpha antennina and Gracilaria corticata, Journal of Chemical and Pharmaceutical Research, 4 (11), 2012, 4870-4874.

Gopalakrishnan K, Prem Jeya Kumar M, Sundeep Aanand J, Udayakumar R, Analysis of static and dynamic load on hydrostatic bearing with variable viscosity and pressure, Indian Journal of Science and Technology, 6 (6), 2013, 4783-4788.

Brintha Rajakumari S, Nalini, C, An efficient cost model for data storage with horizontal layout in the cloud, Indian Journal of Science and Technology, 7, 2014, 45-46.

Jeyanthi Rebecca, L, Susithra, G, Sharmila, S, Das, M.P, Isolation and screening of chitinase producing Serratia marcescens from soil, Journal of Chemical and Pharmaceutical Research, 5 (2), 2013, 192-195.

Kerana Hanirex, D, Kaliyamurthie, K.P, An adaptive transaction reduction approach for mining frequent itemsets, A comparative study on dengue virus type1, International Journal of Pharma and Bio Sciences, 6 (2), 2015, B336-B340.

Sharmila, S, Jeyanthi Rebecca, L, Naveen Chandran, P, Kowsalya, E, Dutta, H, Ray, S, Kripanand, N.R, Extraction of biofuel from seaweed and analyse its engine performance, International Journal of Pharmacy and Technology, 7 (2), 2015, 8870-8875.

IS 383-1970, Specifications for Coarse and Fine Aggregates from natural sources for concrete, Bureau of Indian Standards (BIS), New Delhi, India, 1970.

Shanaang M.J, Bending behavior of ferrocement plates in sodium and magnesium sulphates solutions‖, *Cement & Concrete Composites*, 30, 2008, 597-602.