COMPARISON OF PROPERTIES OF FERROCEMENT AND POLYMER MODIFIED CONCRETE

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***Abstract*: Concrete plays important role in the construction industry but it has some drawbacks .To overcome the drawbacks the search for durable and sustainable construction materials is the need of time. This leads to the developments of concrete composites in combination of various compounds to be used in many applications in world of cement concrete. A better knowledge of materials behavior, especially in the field of admixtures, and a better understanding of curing processes allowed the development of highly performing mineral or modified mineral concretes, mortar sand grouts. The world of concrete with fibers, as well as the world of concrete with polymer has been undergoing major researches to enhance the properties of traditional concrete. Both worlds recognize, strive for and accept each other's contribution to the synergic effects that are realized by the combination of classical building materials and polymers. This report briefly reviews the use concrete composites in combination with polymer, where polymers are in the form of a polymerized matrix coming led with the hydrated cement paste. The micro-structure and properties of composite polymer modified concrete are described and some current possible applications are mentioned. It is observed that using fibers in combination with polymer show further enhancement. Various methodology, emerging trends as well as variations in curing techniques for polymer modified concrete are observed. Also the modern strengthening techniques used for improving the earthquake behavior of structures by aid of fiber reinforced polymers (FRP) are discussed for the use of rehabilitation of existing structures. Several recently published articles and technical papers dealing polymer modified concrete are critically reviewed.**

1.0 INTRODUCTION

Ferrocement is one of the relatively cementitious composite considered as a construction material. It is a type of thin walled reinforced concrete commonly consists of cement mortar reinforced with closely spaced layers of continuous and relatively small wire mesh (ACI 549R, 1997; ACI 549 2R, 2004). The closely-spaced and uniformly-distributed reinforcement in ferrocement, transforms the brittle material into a superior ductile composite. Thus, ferrocement has been regarded as highly versatile construction material possessing unique properties of strength and serviceability. Its advantageous properties such as strength, toughness, water tightness, lightness, durability, fire resistance, and environmental stability cannot be matched by any other thin construction material (Naaman, 1999).

In order to cope with the problem of thickness, one of the options currently suggested is to develop ferrocement elements. This technique provides not only the thickness but makes the element lightweight as well. Presently, it has gained attention to be used as an effective structural form in the building and construction industries.

Ferrocement construction form has distinct advantages over conventional structural sections, because it promises high stiffness and high strength to weight ratios. The introduction of materials such as ferrocement, for the materials like polymer modified mortars presents new possibilities in the design of construction.

Polymer-modified mortars (PMMs), using recently developed high grade redispersible polymer powders and aqueous polymer dispersions, have become popular construction materials in the world. This is because of their excellent performance and durability. PMMs are also considered to be able to become highly sustainable construction materials.

2.0 AIM

The study was aimed to present the effects of polymer addition on compressive strength, flexure strength and modulus of elasticity of mortar and also on flexure and tensile strength of ferrocement beam

3.0 OBJECTIVES

- To determine the workability of the fresh polymer modified mortar with different polymer cement ratio.
- To determine the effect of polymer addition on water cement ratio while maintaining the same workability.
- To obtain the compressive strength of ordinary mortar with polymer modified mortar with constant and varied water cement ratio.
- To obtain the flexure strength and modulus of elasticity of ordinary and polymer modified mortar with the varied water cement ratio.
- To obtain the flexure strength, tensile strength and corresponding deflection or elongation of the polymer modified ferrocement beams.

4.0 Experimental Program

The main aim was to find out the optimum value of polymer in ferrocement mortar and its effect on the properties of mortar. Different properties i.e. compressive strength, flexural strength and modulus of elasticity were studied and later on its effect was studied on flexure and tensile strength of ferrocement samples having a square wire mesh inside it. Prior to evaluate these

parameters the flow value of controlled as well as polymer modified mortar was find out at constant and varied water cement ratio. On the basis of constant flow values obtained by flow test, the different amount of w/c ratio was fixed at each polymer- cement ratio.

5.0 Conclusion

The addition of VAE and SBR polymer in mortar increases the workability. At constant water cement ratio the workability can be increased up to 1.84 times at 15 to 20 % SBR addition.

The compressive strength of polymer modified cement decreases at constant water cement ratio. But at varied water cement ratio the compressive strength of polymer modified cement increases up to 10 % and then starts decreasing after 7 days.

At varied water cement ratio the compressive strength of VAE modified mortars decreases but the compressive strength of SBR modified mortars increases both after 7 and 28 days..

The flexure strength of both VAE and SBR modified mortars increases but after 15 % the flexure strength of VAE modified mortars starts decreasing.

Modulus of elasticity of SBR modified mortars increases with increasing in polymer content up to 10 % and then starts decreasing but modulus of elasticity of VAE modified mortars decreases with increase in polymer content in mortar.

The tensile strength of both VAE and SBR modified ferrocement samples increases with increase in polymer content. The elongation and load of three layered polymer modified ferrocement found more than the two layered.

SBR modified ferrocement beams take more load than VAE for both flexure and tensile strength.

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