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Experimental Investigation on Properties of Concrete using Styrene Butadiene Rubber Latex in Concrete

Bharti Pawar[1], Afzal Khan[2]

[1]M Tech Scholar, [2]Professor,
[1,2]Department of Civil Engineering, Millennium Institute of Technology, Bhopal, Madhya Pradesh, India

ABSTRACT

The use of Styrene Butadiene Rubber Latex in concrete as a construction material in structural applications has drastically increased in recent years. Polymer concrete possesses excellent strength and durability properties. An exhaustive literature survey has been carried out looking into the advantages of polymer modified concrete, so as to study its uses and effect on various properties of concrete. Here, an attempt has been made to present a review on polymer modified concrete and its application to concrete structure.

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INTRODUCTION

This polymerized monomer acts as a binder for the aggregates and the obtained composite is termed as "Polymer Concrete". There are number of growths in the field of polymer concrete date back to the late 1950s when these materials were settled as a replacement of cement concrete for some specific applications. Initial usage of polymer concrete, as reported, was for building cladding and so forth. Later on, it was extensively used as repair material because of rapid curing, high strength, excellent bond to cement concrete and steel reinforcement, and high durability. Precast PC has been used to produce a variety of products such as highway median barriers, acid tanks, manholes, drains, and so forth.

Properties of polymer concrete differ greatly, mainly depending on the conditions of preparation. For a particular type of polymer concrete, the properties depend upon nature and content of the micro-filler, curing conditions, binder content, aggregate size distribution, and so forth. Commonly used resins for polymer concrete are epoxy resins, furan resins, unsaturated polyester resin, urea formaldehyde resin, methyl methacrylate, and polyurethane resins. Usually, more than 75 to 80% volume of the polymer concrete is employed by aggregates and fillers.

Styrene Butadiene Rubber Latex (S.B.R)

In this dissertation the latex used was styrene butadiene rubber latex which is commonly known as S.B.R. S.B.R describe families of synthetic rubbers derived from styrene and butadiene . These materials have good resistance to abrasion and good aging stability whenprotected by additives. In 2012, more than 5.4 million tons of S.B.R were processed worldwide. About 50% of car tyres are made from various types of latexes. The styrene/butadiene ratio effects the properties of the polymer: with high styrene content, the rubbers are harder and less rubbery. S.B.R is not to be confused with a thermoplastic elastomer made from the same monomers, styrene-butadiene block copolymer.

Objectives

- The main aim of this study was out to understand the various effects of polymer addition on the inherent properties of concrete having water-cement ratio at local ambient temperatures. The trial mixes were prepared with SBR latex-cement ratio of 0%, 5%, 10%, 15% and 20%.

Slump Test

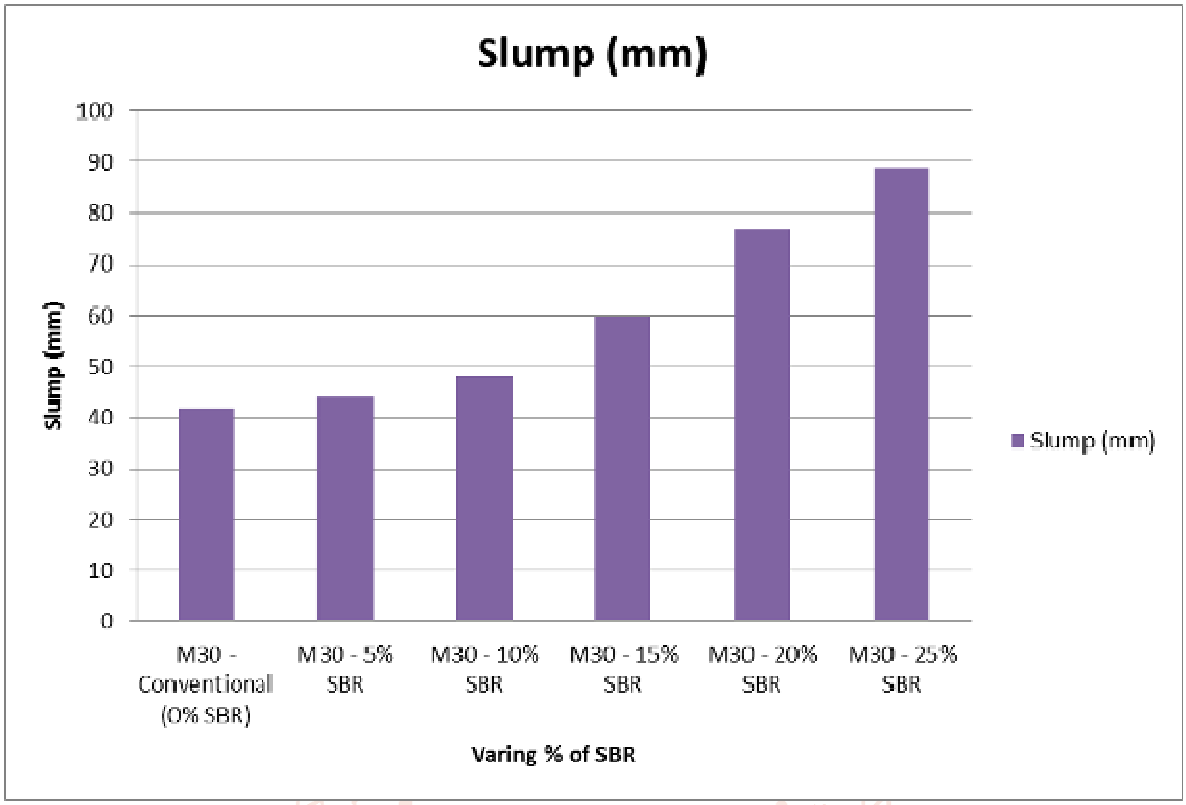

Fig. 1 - Results of Slump test

Compressive strength

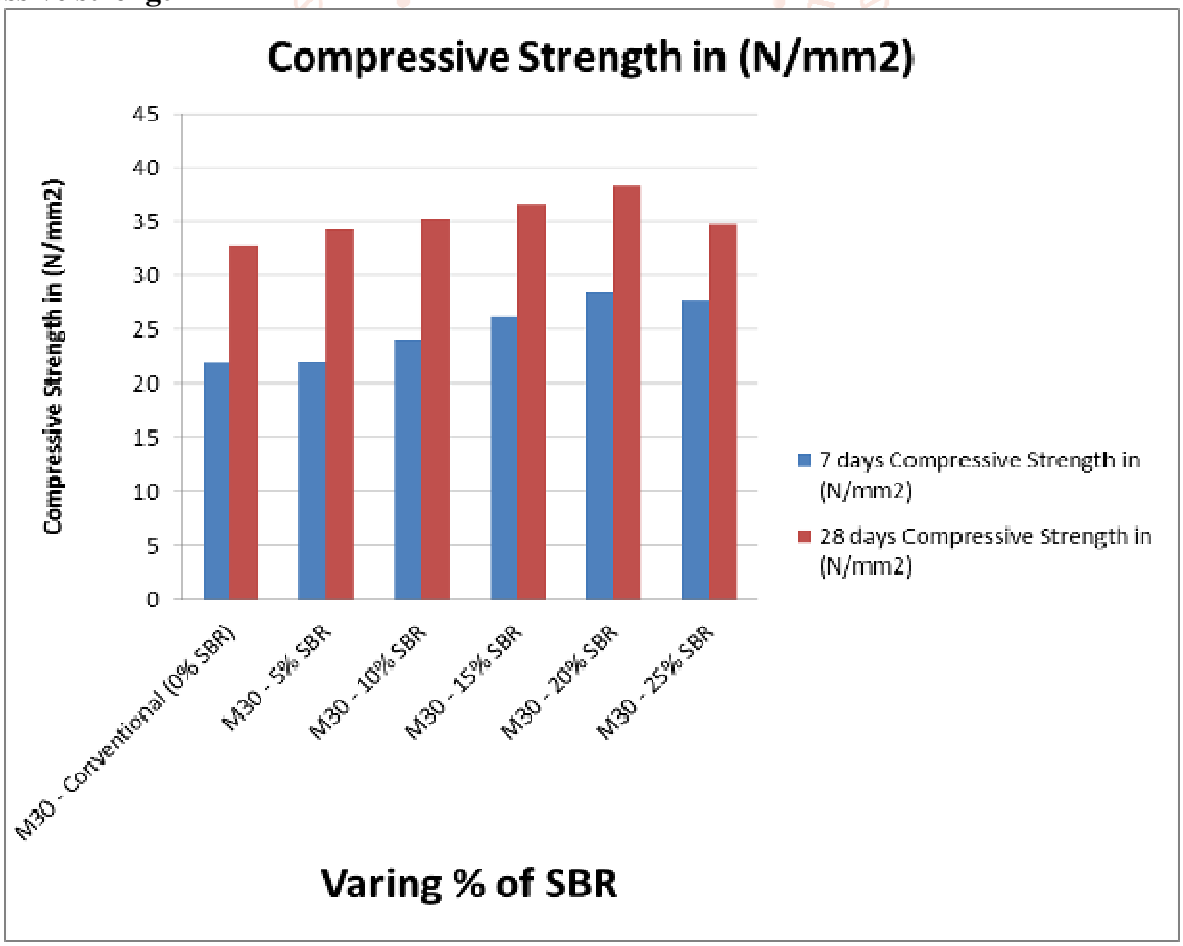

Fig 2 - Results of Compressive Strength test

Flexural Strength test

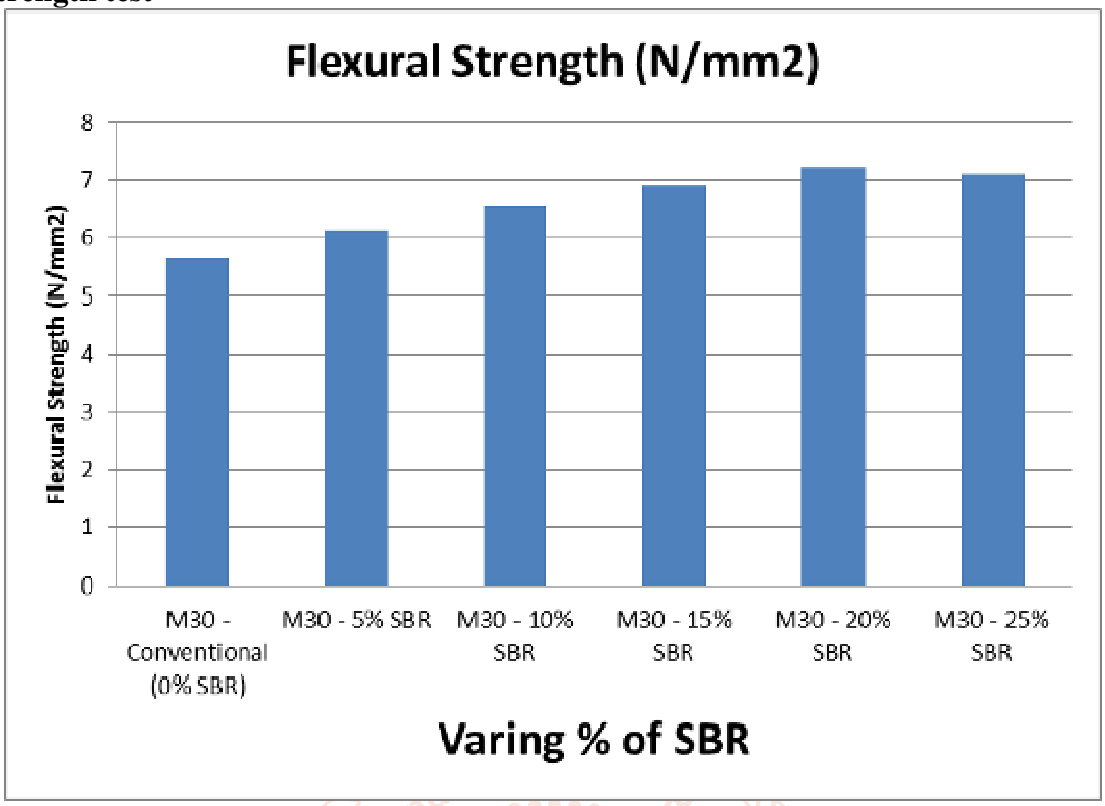

Fig 3 - Results of Flexural Strength test

Conclusion

The maximum increase in compressive strength was at 20% SBR latex content, with an increase of 32.92 to 38.26 (N/mm2) in the Compressive Strength. However, the maximum increase in flexural strength was 5.68 to 7.22 (N/mm2). It has been observed from the test results that the optimum content of SBR latex for cement concrete mix was 20% by weight of cement.

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