



# Experimental Investigation on Flexural Behavior of Latex Modified Silica Fume Based RC Beam

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**Abstract:** The purpose of the experimental investigation is to clarify the flexural behavior of reinforced concrete beam with Poly Acrylic Ester (PAE) Latex and silica fume as partial replacement of cement. The latex modified concrete are to be prepared with various polymer-binder ratio with constant 15% silica fume content replacement by volume of cement. The percentage of latex content was varied as 7.5, 12.5 and 17.5 by the mass of binders (Cement and Silica fume). The optimum latex content is to be obtained from test results. The beam need to be casted and tested for the optimized latex modified concrete shows the better behavior of the control and modified concrete.

Key Words: Poly Acrylic Ester (PAE), Silica Fume, Mechanical Properties, Flexure, Replacement.

## Introduction

Concrete is a composite material with low tensile strength and weak impact resistance. However, it is one of the most widely used construction materials due to its high compressive strength and low cost. Concrete utilized in hydraulic structures is always exposed to harsh marine environment all year round, which usually leads to severe degradation after construction such as aging, spalling, and cracking of the cover concrete. The related studies have pointed out that the deteriorated concrete structures with high-quality cementbased repair materials are an economical and practical way to extend their service life in comparison to the reconstruction of the structures. Therefore, repair materials with an excellent mechanical performance are greatly demanded. Polymers have been used for improving mechanical properties, adhesion with substrates, and waterproofing properties of mortars and concretes. The cement mortar and concrete made by mixing with the polymer based admixtures are called polymer modified mortar and polymer modified concrete respectively. Polymers such as Styrene–Butadiene Rubber (SBR), Poly Acrylic Ester (PAE), Styrene–Acrylic Ester (SAE), and Vinyl Acetate– Ethylene (VAE) have been utilized in mortars and concrete. However, research showed that the incorporation of polymer tended to reduce the compressive strength of cementitious materials. In recent years, PAE has gained more application and has been proven to improve various engineering properties of mortars and concretes, such as workability, water absorption, flexural strength, and crack resistance. 2 Pozzolanic materials can partially substitute Portland

cement in order to enhance the properties of concrete and mortars such as mechanic- and durability related properties. Silica fume (SF) is an industrial byproduct and has been widely used as mineral admixture in concrete and mortar, mainly to improve the mechanical properties and reduce the porosity. Moreover, its durability properties such as sulfate resistance, chloride ion impermeability, and freeze-thaw resistance could also be enhanced. The correct combination of silica fume and polymeric emulsions may result in a construction material with good performance for many applications. The silica fume and polymer latex addition can improve the mechanical properties of concrete.

### **Conclusion**

Comparing the results of conventional and latex modified silica fume concrete shows better results in compressive strength due to the combination of latex and silica fume content.

But indirect tensile strength of latex modified silica fume concrete shows less results comparing the conventional concrete.

The latex modified silica fume concrete while comparing the conventional concrete and shows better flexural behavior in load vs deflection graph.

### **LITERATURE CITED**

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