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A Review paper on An Analysis of Elastic Modulus of Recycled Aggregate concrete with and without Silica Fume

[1]Sachin Kumar, [2]Avani Koshish, [3]Shivam Kumar, [4]Raman Pal

[1]Student, [2]Assistant Professor, [3]Student, [4]Student
Meerut Institute of Engineering and Technology, Meerut, India

Abstract: **Recycling aggregate is a waste material of the part of the concept of sustainability for the construction materials and the recycling materials is making the important role by the conserve the natural resource in the construction work. Recycled aggregate concrete has been made a very economically and environmentally. In this paper, we will investigate the analysis of Elastic Modulus of Recycled Aggregate Concrete (RAC) with and without Silica Fume (SF) by replacing the Natural Coarse Aggregate (NCA) with the weight percentage of 0%, 25%, 50%, 75% and 100% of the Recycled Coarse Aggregate (RCA) and replacing the Cement material with the weight percentage of 0%, 4.5%, 9%, 13.5% and 18% of Silica Fume (SF) of M40 Grade of concrete. In the concrete we are using the Ordinary Portland Cement of 43 Grade. In this study, we determine the compressive strength, split tensile strength elastic modulus, stress and strain and make the stress-strain curve with replacing the natural aggregate to recycled aggregate with their percentage and using the silica fume and without using the silica fume.**

Index Terms **- Recycled aggregate concrete (RAC), Silica fume (SF), Elastic modulus, Natural aggregate (NA), Recycled aggregate (RA), Compressive strength, Spilt tensile strength.**

INTRODUCTION:

Concrete is the important material for construction work in civil engineering. All concrete ingredients are available in nature but the properties of concrete have been changed by adding the other materials. The less cement and nature aggregate are used to make the concrete and the less impact on the environment. Recycling waste concrete is beneficial and necessary for the environment preservation and effective utilization and resources. Recycled aggregate like as waste concrete is used for make new concrete for effective utilization of waste concrete. The natural coarse aggregate was replaced with recycled aggregate prepared by the old concrete, then the decreasing of compressive strength was observed generally. The mechanical properties of concrete as compressive strength, split tensile strength, and elastic modulus is decreased with increasing the percentage weight of replaced aggregate. Silica fume can be used replacing of cement or as an additional cementitious material in concrete.

Elastic modulus is the important mechanical parameter for reflecting the ability of concrete to deform elastically and it is a rather complex and time consuming. Recycled aggregate contains high absorption, rough texture and angular than natural aggregate, so increase the strength of recycled aggregate, silica fume is used for making the concrete and replacing of cement as percentage weight.

In this research work, an analysis of elastic modulus of recycled aggregate concrete with and without silica fume. For the elastic modulus, the evaluation of compressive strength and split tensile strength are made by the experiments and make the stress-strain relationship by replacing the natural aggregate with recycled aggregate and replaced the cement with silica fume. The concrete is made with the replacing the natural aggregate as percentage weight 0%, 25%, 50%, 75% and 100% of recycled aggregate and replacing of cement as percentage weight 0%, 4.5%, 9%, 13.5% and 18% of silica fume.

LITERATURE REVIEW:

[1] Jianzhuang Xiao et. al. (2004) studied the mechanical properties of recycled aggregate concrete under uniaxial loading. It has used for the recycled aggregate concrete for the percentage of 0%, 30%, 50%, 70% and 100% of the normal aggregate and determine the compressive strength, toughness, plastic energy capacity, elastic energy and elastic modulus decrease when the Recycled Aggregate Concrete (RAC) is increase the given percentage of Natural Aggregate (NA) by making the cubes and prisms for the mechanical properties.

[2] Faiz A.M. Mirza and **Mohammed A. Saif (2010)** studied the mechanical properties of recycled aggregate concrete incorporating silica fume. In this research, the effect of silica fume on the compressive strength, tensile strength as replacing the cement at the percentage of 0%, 5%, 10%, and 15% of silica fume.

[3] Zhen-Hua Duan et. al. (2013) suggested that the elastic modulus of Recycled Aggregate Concrete (RAC) can be used the ANN models for determining the elastic modulus of Recycled Aggregate Concrete (RAC) by replacing of natural aggregate to recycled aggregate.

[4] Gonzalez Andreu and **Exteberria Miren (2013)** studied the analysis of properties of high performance recycled aggregate concrete by using the Portland cement and Super plasticizer for the compressive strength, flexural strength, tensile strength and elastic modulus. It has used the three types of recycled coarse aggregate like their strength 100Mpa, 60Mpa and 40Mpa after 28 days curing.

[5] K. Usha Nandhini et. al. (2014) studied the Influence of recycled aggregate on strength properties and elastic modulus of concrete. It has used the recycled aggregate with the percentage of 0%, 30%, 60% and 100% with natural aggregate and used the super-plasticizer for get the compressive strength, split tensile strength, flexural strength and elastic modulus for the M20 and M40 grade of concrete mix design.

[6] J. Kalyana Chandrasekhar Reddy and **P.S.S. Anjaneya Babu (2016),** it has significance of silica fume on the mechanical properties of Recycled Aggregate Concrete (RAC). Compressive strength and tensile strength are made by the replacement of cement by 0%, 5% and 10% of silica fume and taken water-cement ratio is 0.43 and then adding the super-plasticizer, the water cement ratio is 0.42.

[7] Faiz Uddin Ahmed Shaikh (2017) used the cementitious materials by replacing with fly ash as percentage weight 20-30% and silica fume as percentage weight 5-10% of Ordinary Portland Cement (OPC) cement. 20-30% replacement of Natural Aggregate (NA) by Recycled Aggregate (RA) adding of 10% Silica Fume (SF), improved in compressive strength, tensile strength and elastic modulus of concrete contain 50% Recycled Aggregate Concrete (RAC) and 40% slag compared to 5 to 15% Silica Fume (SF) after 3days and 7days.

[8] Sushree Sunayana and **Sudhikumar V. Barai (2017)** examine the mechanical properties of 15%, 30%,50% and 100% replacing of Recycled Aggregate (RA) with fly ash by cement and Natural Aggregate. Recycled aggregate is used at 100% incorporating up to 50% fly ash can be made concrete by PPM mic design and design mechanical properties, minimal cement content having positive effect on cost and environmental.

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