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RESEARCH ARTICLE

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A REVIEW ON USE OF GGBS WITH BUBBLE STABILITY IN FRESH CONCRETE

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Abstract

To improve the stability of air bubbles in fresh concrete, it is great significance to better understanding of the mechanisms and main influencing factors of bubble stability in fresh concrete. The according to study report of strength analysis of GGBS concrete it will give assurance to encourage people working in the construction industry for beneficial and economical use of it in large amount . The results show that the surface tension of air-liquid exerts impact on bubble stability by reducing surface free energy. Surface tension may not be the only determinant of bubble stability. Concrete bubble is a common phenomenon in the concrete construction process. The application of Air Entraning Agent (AEA) is a current trend and plays a key role in bubble stability. Generation and existence of concrete air bubble is not only influence the concrete appearance, but also affects service life of concrete. Use of GGBS as cement replacement is simultaneously reduces cost of concrete and help to reduce rate of cement consumption in concrete. Ordinary Portland cement 53 grade and replacement cement with Ground Granulated Blast Furnaces Slag (GGBS). The investigation on compressive strength ofthe concrete at different ages such as 7 days, 14 days, 28 days, and 56 days .the GroundGranulated Blast Furnaces Slag (GGBS) is replaced 0% ,5%,10%, 15%,20% and 25% in the OPC53 cement.

Introduction:-

Air-entrainment agent (AEA) also improves workability and reduces the segregation of fresh concrete.A large quantity of tiny and stable air bubbles created by air-entraining agents act as a “pressure-relief reservoirs” in hardened concrete. The ground granulated blast furnace slag(GGBFS) is a by-product of iron manufacturing . The formation of GGBS is not direct. The by-product of iron manufacturingis a molten slag and molten iron. The molten slagc onsists of alumina and silica, also with the certain amount of oxides. The main constituents of blast furnace slag are CaO, SiO2, Al2O3 and MgO. when GGBS is added to concrete improves its properties such as workability, strength and durability of concrete . The resistance oF surface scaling is also associated with the

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characteristics of the near-surface concrete layer. which is affected by the W/B ratio, air entrainment, microcracks, sedimentation and carbonation ,etc. Some standards impose on the ggbs amounts due to frost resistance issue. The knowledge of the chemical composition of cement and ggbs is not sufficient for determining the final durability effect of concrete. Each material variant is needs to be verified experimentally, to qualify the adequacy of the adopted solution. It has been well known ground granulated blast-furnace slag (GGBS) can beincrease the abilities to prevent water penetration and chloride penetration, and it can be also improve the durability of concrete. the use of GGBS for concrete material contributes to the save the natural resources and energy in cement manufacturing process and to reducing CO2 emissionsand environment impact, etc.

Literature Review:-

Santosh Kumar Karri, G. V. Rama Rao,P. Markandeyaraju(10 Oct 2015)

This paper focuses on investigating of characteristics of m20 and m40 grade concrete with partial replacement of cement with ground granulated blast furnace slag (GGBS) by replacing cement 30%,40%,50%. The cubes, cylinder and prism are tested for compressive strength, split tensile strength, flexural strength, durability studies with sulphuric acid and hydrochloric acid also conducted .According to this paper workability of concrete increases with the increasing GGBS replacement level . The compressive strength values of acid effected concrete decreases on comparison with of normal concrete, but the effect of acid on concrete decreases with theincrease of percentage of GGBS. At 40% replacement of GGBS the resistance power of concrete is more obtain.

Dr. Suresh And K. Nagaraju (2015):

In this paper Investigate characteristics of concrete with partial replacement of cement with GGBS. This paper deals with GGBS, its advantages and disadvantages.. Author carried out experiment on GGBS concrete by replacing it with OPC by 50%, 60%, 80% and 90%. It is observed that GGBS is good replacement to cement in some cases, but it cannot replace cement completely . it replaces partially it gives very good result.

Guangcheng Long, Hussaini Abdullahi Umar 2, Cong Ma:

In this work, the process of formation and collapse of air bubbles in concrete is characterized.

Fresh concrete is a complicate system and the stability of the air bubble is affected by many factors.. the recent advances of major influencing factors of bubble stability are summarize and the use of nano-silica is proposed to improve the stability of air bubbles in fresh concrete. Most of the research on bubble stability in fresh concrete concentrate on field application and macroscopic phenomena, and microscopic research . the quantified investigation on bubble stability is focuses on the stability of the foam. the mechanisms of foam stability cannot be completely applicable to the bubble stability in fresh concrete.

Quaid Johar Bhattiwala, Kuldeep Dabhekar :

The workability of concrete increases the compressive strength of concrete, but in case of 40% replacement of concrete it gets increases. As in 7 days compressive strength on 40% replacement it gets the highest strength.. As in 7 days of compressive strength of concrete after 40% replacement there is decrease in the strength . As in 28 days compressive strength get decrease of control concrete, and get increase by 6% at 30% replacement concrete . according tothe particle packing theory of concrete it explains that the bonding of coarser particles and the fine particles and make the bond strong . as the GGBS is finer particles than cement therefore 40% GGBS and 60% cement, as in this mix concrete gives the higher strength and it gets the proper particle bonding.

J. Wawrzeńczyk1 , A. Molendowska2 , T. Juszczak :

In these paper based on the analysis of the results from the tests performed on concrete specimens . a binder containing 0 to 55% slag, at the constant W/B=0.42 ratio and three air entrainment levels. The air bubbles grow in size, as confirme by the fact that at a considerable amount of micropores A300 , the values of α are quite low (smaller than 20 mm-1). The test results indicate that in order to obtain the desire space factor (L) at the level of 0.20÷0.25 mm, atleast 2.5 % of micropores .A300 is to be in corporate.

Qi Yang:

The four kinds of AEA is compare on their abilities of entraining and stabilizing the air bubbles in concrete. At the normal dosages, both BASF and GYQ reveale a good capability of stabilizingthe air bubbles in concrete . the Sika 88 L and Sika-S is more sensitive to the mixing before tests. For BASF, it also show a little increase of air content within the first hour. measurements by AVA, BASF can produce the most efficient air (with the bubble size).

When comparing the maximum air content, Sika-S shows the best ability of both entraining and stabilizing a high volume of air bubbles. Sika 88 L can entraing a large amount of air bubbles as Sika-S. GYQ and BASF show their ability of stabilizing the air bubbles but the maximum air content they can entrain in the concrete is less than Sika-S and Sika 88 L. It is obvious that Sika-S is the best choice for entraining high volume of air with a satisfactory stability.

Methodology:-

1. Collection Of Raw Materials
2. Tests On Cement And GGBS
3. Tests On Coarse Aggregate
4. Tests On Fine Aggregate
5. Mixing Of Concrete
6. Study On Material & Testing
7. Casting And Testing Of Concrete
8. Conclusion

Conclusion:-

The nominal mix concrete of workability is good and OPC 53 is partially replaced with GGBS by use of air entrancing admixture is reduced than the normal concrete. The admixture is use during the casting of concrete is most important parameter for formation of air bubbles in concrete. After addition of AEA in water start bubbles formation .The stability of air bubbles in concrete may also be dominated by the strength of the bubble membrane and the gas diffusionrate through bubble.

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