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J Civil Environ Eng 2016, 6:5 (Suppl)
http://dx.doi.org/10.4172/2165-784X.C1.009

2nd World Congress and Exhibition on

Construction & Steel Structure

September 22-24, 2016 Las Vegas, USA

Structural capacity investigation of concentrically braced members

Mehmet F Yılmaz and **Kasim A Korkmaz**
Istanbul Technical University, Turkey

There are various approaches and engineering practices to constitute lateral stability against the lateral loads in steel structures. Braced members are one of the widely used approaches and practices. They are used to increase the structural capacity under earthquake effects. Structural capacity of the buildings with braced members is higher than the capacity of conventional steel structures. Concentric and eccentric ones are available for steel structures. Concentrically braced members are most common structural systems using to restrain lateral displacement and constituted lateral rigidity. With development of computer technology, more complex analyses becomes possible and popular for braced members. Now, various approaches are available to calculate the capacity of the braced members. These approaches are as finite element and physical theory methods. Recently, finite element methods became popular in structural design in many cases despite the fact that it's computationally complexity. Physical theory method based on fundamental structural behavior, provides a balance of efficiency and accuracy. Force analog and sliding hinge methods are the most common ones in physical theory method for determining capacities of braced members. In this study, finite element method and physical theory method as force analog method and sliding hinge method will be considered to calculate the capacity of concentrically braced members. Also, design capacities will be calculated based on the valid design codes and specifications. The ultimate capacities, calculated with these methods are compared with each other. Calculated design capacities are compared with ultimate capacities; hence, security coefficient that the specification provides will be evaluated.

fatih.yilmaz@omu.edu.tr

Chemical effect on compressive strength of concrete incorporating with rice husk ash

Onkar Singh Sidhu and **Gurpreet Singh**
Punjabi University, India

Rice husk ash is a by-product obtained from burning of rice husk. It is a health hazard and has many adverse effects and hence this necessitates its proper disposal. It is with this concept in mind that the present study has been undertaken to explore the possibility of use of rice husk ash as partial replacement for cement in cement concrete. Rice husk is unique in its composition and its physical properties are greatly affected by burning conditions. It contains a large portion of reactive silica with minor amount of other impurities. This reactive silica facilitates the use of rice husk ash as a potential admixture in the pozzolana cement. Also, the deterioration of concrete structures day by day due to aggressive environment is compelling engineers to assess the loss in advance so that proper preventive measures can be taken to achieve required durability and reliability of concrete structures. The compounds present in set portland cement are attacked by water and many salt solutions and acids. The present study has been undertaken to investigate the effect of partial replacement of cement with varying percentages of rice husk ash (0%, 5%, 10% and 20%) on durability aspects of concrete, when exposed to varying degree of aggressive attack due to sulphates, nitrates and chlorides. A total of 72 numbers of cubes of size 150 mm x 150 mm x 150 mm for compressive strength of M-25 grade by varying the dosage of RHA from 5% to 20% were cast. After 28 days of moist curing, the concrete cubes were placed in solutions of magnesium sulphate, ammonium nitrate and potassium chloride respectively with varying percentages of these salts namely 4% and 8%. The specimens were exposed to aggressive environment for 28 days and 45 days and then were tested for their compressive strength. There is increase in compressive strength of RHA concrete with increase in age i.e. the 45 days compressive strength of RHA concrete of 4% and 8% diluted solution is more as compared to the 28 days compressive strength. The maximum adverse effect on compressive strength of 0%, 5% and 10% RHA concrete is that of potassium chloride followed by ammonium nitrate. The minimum adverse effect on compressive strength of 0%, 5% and 10% RHA concrete is that of magnesium sulphate. Whereas for 20% RHA concrete the maximum adverse effect is that of potassium chloride followed by magnesium sulphate. The minimum adverse effect on compressive strength of 20% RHA concrete is that ammonium nitrate.

onkar_civil@pbi.ac.in