EVALUATION OF SHEAR DESIGN PROCEDURES ADOPTED IN THE INDUSTRY FOR REINFORCED CONCRETE

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Abstract

Application of reinforced concrete as a construction material was first found in the middle of the 19th century. Over the last one and half centuries it has become a popular and widely accepted construction material. Its applications span from in small domestic structures to large structures like massive dams, bridges, offshore platforms provides evidence for its potential.

Shear design is an important area of the reinforced concrete designing process. This study reviews the shear designing approaches for reinforced concrete beams. From the beginning the shear behaviour of reinforced concrete beams was mysterious. The first analytical model to explain the shear behaviour of a reinforced concrete beam was postulated in 1899 by a Swiss engineer called Ritter and a German engineer called Morsch (1902). They independently introduced the Truss Model to use in shear design. Since then various theories have been put forward to explain the shear behaviour of reinforced concrete beams. But, still none of them seems to have resolved the is~ue by producing results relating theory to experiment to a higher degree of accuracy when compared to flexural design.

This study identifies reasons for those theories to deviate from the experimental results. Some of them are conventional parameters used in design equations whereas others are new for these design methods. Also it identifies when these parameters ,become critical for deviation of the predicted results from the experiment. Ultimately this study identifies when these theories are justifiable for shear designing of reinforced concrete. Also it evaluates the practices followed in design offices in Sri Lanka for shear design and recommends the best practises to ensure adequate safe guard against a premature failure. Results of this study shows that Canadian Code General method and Australian Code method give most accurate results and can be recommended to use within the limitations specified in the code. Further this study shows that Japanese Code design method can be recommended for conservative shear designing without any restrictions on parameters. But this method is less accurate than the Canadian Code General method and Australian Code method.