Cairo University

SIZE EFFECT ON SHEAR STRENGTH OF NORMAL AND WIDE BEAMS WITH NORMAL AND HIGH STRENGTH CONCRETE

By

Mohamed Gamil Elsayed Megahed

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
in
Structural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Under the Supervision of

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Title of Thesis:

Size Effect on Shear Strength of Normal and Wide Beams With Normal and High Strength Concrete

Key Words:
shear strength; concrete beams; size effect.

Summary:

The main objective of this research was to investigate to what extent the beam depth, width, longitudinal reinforcement ratio and concrete compressive strength, influence the ultimate shear capacity of reinforced concrete beams without transverse reinforcement. An experimental program was undertaken to study these parameters and to evaluate the empirical formula of the current Egyptian Code of practice (ECP 203-2017) [1] for calculating shear strength of concrete beams. The experimental program was performed for eighteen beams with variables depths; 125, 250, 350, and 600 mm. The concrete cube compressive strength varied from 25 MPa. To 87.5 MPa. The longitudinal reinforcement ratio varied from .8 % to 1.2%. The tested beams had constant clear span to effective depth ratio (l/d=6). It was found that the shear strength of beams decreases as the beam effective depth increases, and as longitudinal reinforcement ratio decreases. The ultimate load of the tested specimens was verified analytically using a finite element program "ABAQUS 6.13", and the obtained predictions gave a good agreement with the experimental results. A parametric study was performed using the same finite element program to estimate the ultimate shear capacity of various depths of beams.

Disclaimer

I hereby declare that this thesis is my original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

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