

Shear Strength of Reinforced Concrete Masonry Beams Without Web Reinforcement

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Abstract:

Reinforced concrete masonry (RCM) beams, referred to generally as lintels, are often needed to span various openings such as windows, doors, etc. Currently, the design of such beams is based on a Working Stress Design approach. There is, however, a very apparent need to change this to an Ultimate Strength approach for reasons of economy and consistency with the design of other structural elements such as reinforced concrete and steel. In addition, a better understanding of the behavior of RCM elements under bending moments and shearing forces is required for a rational design of such elements.

This work presents an in-depth study of the behavior of RCM beams, without web reinforcement, subjected to shearing forces and bending moments. The factors studied are the only ones which have been shown, by other research, to have a significant effect on the beam strength; namely, longitudinal steel ratio, the ratio between beam depth and shear span, and beam depth.

To study the behavior of beams without web reinforcement, a total of 49 beams were tested for this purpose. The phenomenon of increasing the shear strength while decreasing the value of the depth/shear span ratio did occur, but to a lesser extent than seen in the case of RC beams; and, in the range studied, the longitudinal reinforcement ratio has no significant effect on the strength of the beams tested. As well, a decrease in the shear strength accompanied an increase in the beam depth.

Based on the test results of this work, and on the results of the other 45 beams tested by other researchers, a formula for strength is proposed.

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