DOI	https://doi.org/10.1061/(ASCE)0733-9445(2001)127:1(43)
Title	Analytical Model for Predicting Shear Strength of Squat Walls
Background	
Why this paper? How'd you find it?	Found while looking for existing literature and code equations for predicting the shear strength of squat reinforced concrete walls. This paper was also cited by other works and subsequently further simplified in 2017 (https://doi.org/10.14359/51689787)
Study Objective	Proposes a new softened strut and tie model to predict shear strength of squat walls under strong axis loading. The model is applied to previous experimental tests for validation.
Intended gaps to fill	To expand the strut and tie model to predict shear strengths of shear controlled elements, in particular of reinforced concrete squat walls.
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Funding Source	?
Journal / Field	Journal of Structural Engineering, ASCE
Date	2001
Historical Context	Squat structural reinforced concrete walls are often governed by shear due to their low aspect ratio and cannot be accurately predicted with the same level of confidence as other types of failure. This becomes more crucial in seismic prone regions where the ductility of these walls can govern the overall design of the structure. Squat concrete walls in buildings are typically present for low-rise construction and current (at the time) ACI 318 provisions employ empirical expressions based on shear strength of beams, calibrated to an experimental dataset of shear walls. However, these predictions have a large scatter when compared to the actual test results and may also neglect the possibility of other failure modes. In particular, the ACI 318 provisions were based on diagonal tension type failure modes and may not account for other failure modes such as diagonal compression (discussed in the paper), vertical bar buckling, or sliding failure. As a result, there is a need for a design methodology more rooted in mechanical behavior rather than empirical regression.
Relationship to SEMM	CE244, Design
Methods	
Given:	Squat wall geometry, reinforcement ratio, applied axial loads, material strengths
Find:	Peak shear strength of a concrete squat wall
Experimental Design	A model is predicted and then validated with 62 previous squat wall tests
Test Subjects	A variety of squat walls reported to 1) have failed in web shear, 2) be one storey walls, and 3) contained uniformly distributed web reinforcement
Results	
Baseline for comparison	ACI 318-95
Metric for comparison	Ratio of experimental peak shear strength to predicted shear strength
Difference from baseline	slightly better accuracy (1.05-1.18 vs 1.26) and smaller spread (COV of 0.17-0.21 vs 0.34)
Conclusions	
Authors'	The new model is better than ACI 318-95 for squat shear wall strength, especially for rectangular walls. Model is sensitive to wall type and amount of axial load, with potential adjustments possible but not fully studied
Yours	Good rational basis for understanding force distribution in a squat wall rather than relying on previously developed equations or empirical formulas. Note that this is relevant mainly for the diagonal compression failure mode.
Applications	Design

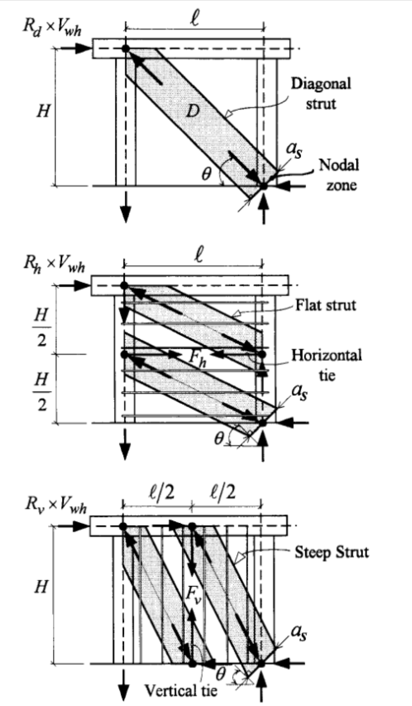

FIG. 2. Wall Shear Resisting Mechanisms: (a) Diagonal; (b) Horizontal; (c) Vertical

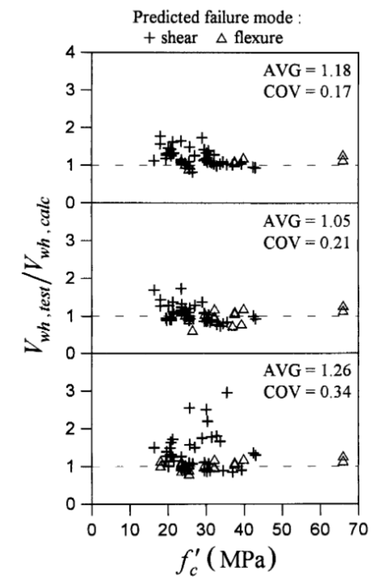

FIG. 9. Correlation of Experimental and Predicted Wall Shear Strength: (a) General Method; (b) Simple Method; (c) ACI 318-95