



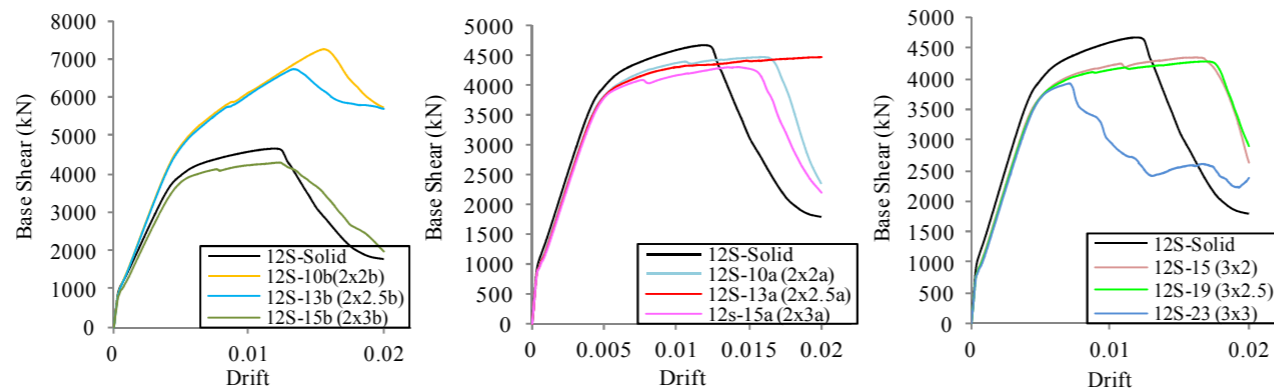
“Analytical Modeling and Seismic Performance Assessment of Shear Walls with Irregular Opening”



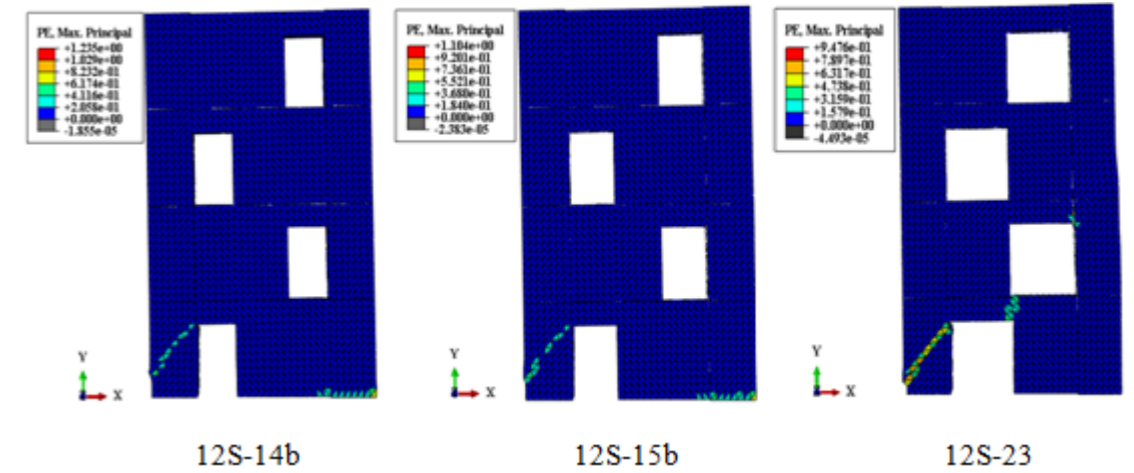
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Staggered Shear Walls Geometric Properties of Numerical Models						
Specimens	Width (m)	Height (m)	Ratio of Opening Area to Wall Area (%)	Angle between Corners (Degree)	Japanese Code Limitation	Chinese Code Limitation
12S-14b	1.8	3	14	22	Not Ok	Ok
12S-10a	2	2	10	90	Ok	Ok
12S-10b	2	2	10	44	Ok	Ok
12S-13a	2	2.5	13	90	Ok	Ok
12S-13b	2	2.5	13	36	Ok	Ok
12S-15a	2	3	15	90	Not Ok	Not Ok
12S-15b	2	3	15	26	Not Ok	Not Ok
12S-15	3	2	15	90	Not Ok	Not Ok
12S-19	3	2.5	19	90	Not Ok	Not Ok
12S-23	3	3	23	90	Not Ok	Not Ok
12S-13,19	2,3	2,5	13,19	56	Not Ok	Not Ok

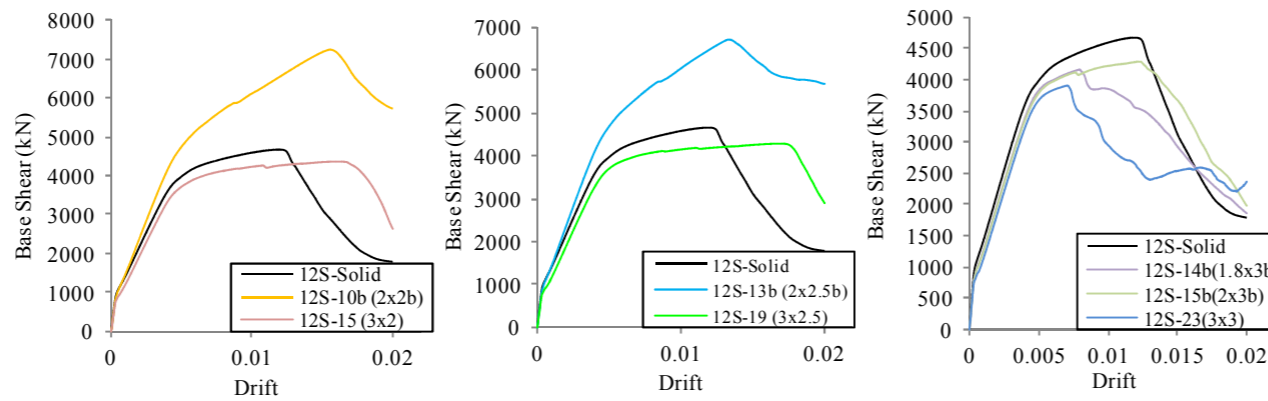
Effect of Opening Height on Seismic Performance of Shear Wall



Shear Failure in the Staggered Shear Walls

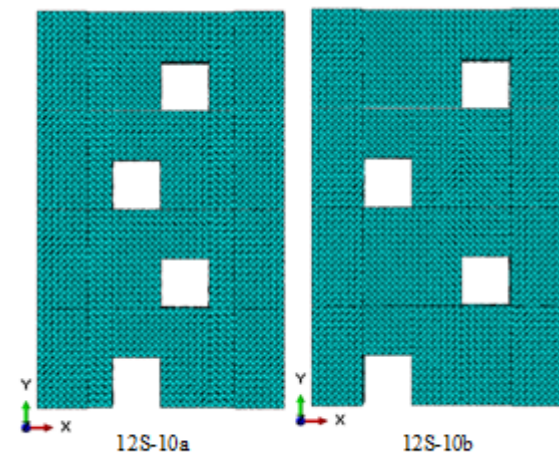
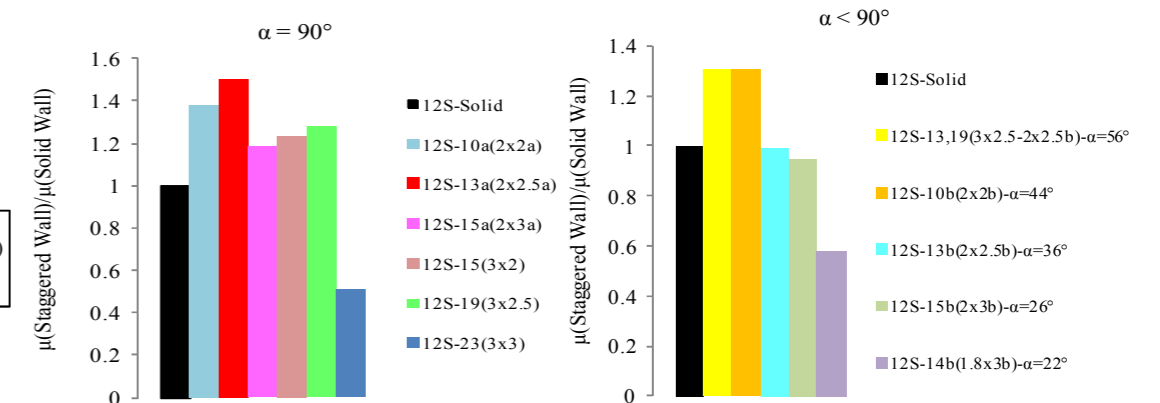


Effect of Opening Width on Seismic Performance of Shear Wall



Ductility Assessment

Effect of Angle between Corners on Ductility of Shear Wall



Staggered Shear Walls Scheme

Formulas for Concrete Shear Wall with Attached to Boundary Condition Irregular Openings

$$F = 1392.459W^{-2.218} \times H^{-0.152} \times A^{1.064}$$

$$k = 5967.187 \times W^{-2.089} \times H^{-0.008} \times A^{0.692}$$

$$\mu = 16.069 \times W^{0.541} \times H^{-1.313} \times A^{-0.227}$$

Formulas for Concrete Shear Wall with Close to Boundary Condition Irregular Openings

$$F = W^{-2.33} \times H^{-0.09} \times A^{2.32}$$

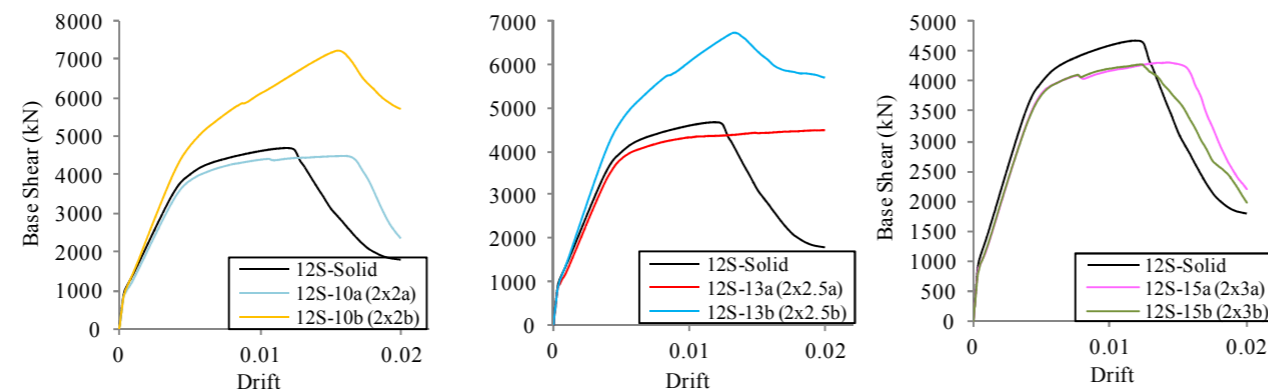
$$k = W^{1.279} \times H^{-0.213} \times A^{0.197}$$

$$\mu = (W \times H)^{-0.305} \times A^{0.397}$$

F = Base Shear (kN), k = Stiffness (kPa), μ = Ductility

A = Angle of Corners (Degree), H = Opening Height (m), W = Opening Width (m)

Effect of Opening Location on Seismic Performance of Shear Wall



Effect of Opening Size and Location on Ductility of Shear Wall

