# SUPPLmentary Material

The experimental database for reinforced concrete shear walls constructed in this study is presented in Table S1.

**Table S1.** Experimental database for reinforced concrete shear walls (1/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Lefas et al. (1990a) | SW11 | F | 1.100 | 10.714 | 0.269 | 0.137 | 0.348 | 0.149 | 0.000 | R | 0.000 |
|  | SW12 | F | 1.100 | 10.714 | 0.262 | 0.133 | 0.340 | 0.146 | 0.102 | R | 0.000 |
|  | SW13 | F | 1.100 | 10.714 | 0.346 | 0.176 | 0.449 | 0.192 | 0.208 | R | 0.000 |
|  | SW14 | F | 1.100 | 10.714 | 0.334 | 0.170 | 0.433 | 0.185 | 0.000 | R | 0.000 |
|  | SW15 | F | 1.100 | 10.714 | 0.325 | 0.165 | 0.421 | 0.180 | 0.102 | R | 0.000 |
|  | SW16 | F | 1.100 | 10.714 | 0.272 | 0.138 | 0.352 | 0.151 | 0.212 | R | 0.000 |
|  | SW17 | F | 1.100 | 10.714 | 0.291 | 0.050 | 0.401 | 0.161 | 0.000 | R | 0.000 |
|  | SW21 | F | 2.115 | 10.000 | 0.342 | 0.121 | 0.453 | 0.137 | 0.000 | R | 0.000 |
|  | SW22 | F | 2.115 | 10.000 | 0.290 | 0.103 | 0.383 | 0.116 | 0.106 | R | 0.000 |
|  | SW23 | F | 2.115 | 10.000 | 0.307 | 0.109 | 0.406 | 0.122 | 0.212 | R | 0.000 |
|  | SW24 | F | 2.115 | 10.000 | 0.304 | 0.108 | 0.401 | 0.121 | 0.000 | R | 0.000 |
|  | SW25 | F | 2.115 | 10.000 | 0.326 | 0.116 | 0.431 | 0.130 | 0.214 | R | 0.000 |
|  | SW26 | F | 2.115 | 10.000 | 0.488 | 0.086 | 0.644 | 0.194 | 0.000 | R | 0.000 |
| Lefas et al. (1990b) | SW30 | F | 2.115 | 10.000 | 0.234 | 0.060 | 0.515 | 0.155 | 0.000 | R | 0.000 |
|  | SW31 | F | 2.115 | 10.000 | 0.200 | 0.052 | 0.441 | 0.133 | 0.000 | R | 0.000 |
|  | SW32 | F | 2.115 | 10.000 | 0.132 | 0.034 | 0.289 | 0.087 | 0.000 | R | 0.000 |
|  | SW33 | F | 2.115 | 10.000 | 0.143 | 0.037 | 0.315 | 0.095 | 0.000 | R | 0.000 |
| Pilakoutas et al. (1995) | SW4 | F | 2.000 | 10.000 | 0.046 | 0.058 | 0.383 | 0.116 | 0.000 | R | 0.000 |
|  | SW5 | S | 2.000 | 10.000 | 0.081 | 0.039 | 0.513 | 0.021 | 0.000 | R | 0.000 |
|  | SW6 | FS | 2.000 | 10.000 | 0.044 | 0.032 | 0.367 | 0.018 | 0.000 | R | 0.000 |
|  | SW7 | FS | 2.000 | 10.000 | 0.081 | 0.067 | 0.510 | 0.134 | 0.000 | R | 0.000 |
|  | SW8 | F | 2.000 | 10.000 | 0.037 | 0.027 | 0.345 | 0.036 | 0.000 | R | 0.000 |
|  | SW9 | F | 2.000 | 10.000 | 0.044 | 0.032 | 0.407 | 0.046 | 0.000 | R | 0.000 |
| Salonikios et al. (1999) | LSW1 | SL | 1.000 | 12.000 | 0.157 | 0.157 | 0.448 | 0.467 | 0.000 | R | 0.000 |
|  | LSW2 | SL | 1.000 | 12.000 | 0.079 | 0.079 | 0.352 | 0.480 | 0.000 | R | 0.000 |
|  | LSW3 | SL | 1.000 | 12.000 | 0.071 | 0.071 | 0.318 | 0.434 | 0.070 | R | 0.000 |
|  | MSW1 | F | 1.500 | 12.000 | 0.133 | 0.133 | 0.381 | 0.257 | 0.000 | R | 0.000 |
|  | MSW2 | F | 1.500 | 12.000 | 0.065 | 0.065 | 0.290 | 0.256 | 0.000 | R | 0.000 |
|  | MSW3 | F | 1.500 | 12.000 | 0.071 | 0.071 | 0.316 | 0.278 | 0.070 | R | 0.000 |
| Park et al. (2015) | S1 | S | 1.167 | 7.500 | 0.093 | 0.073 | 1.287 | 0.000 | 0.070 | R | 0.000 |
|  | S2 | S | 1.167 | 7.500 | 0.093 | 0.070 | 1.287 | 0.000 | 0.070 | R | 0.000 |
|  | S3 | S | 1.167 | 7.500 | 0.061 | 0.048 | 0.851 | 0.000 | 0.070 | R | 0.000 |
|  | S4 | S | 1.167 | 7.500 | 0.076 | 0.073 | 1.287 | 0.714 | 0.073 | B | 0.176 |
|  | S5 | S | 1.167 | 7.500 | 0.051 | 0.036 | 1.298 | 0.000 | 0.070 | R | 0.000 |

**Table S1.** Experimental database for reinforced concrete shear walls (2/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Park et al. (2015) | S6 | S | 1.167 | 7.500 | 0.033 | 0.024 | 0.851 | 0.000 | 0.070 | R | 0.000 |
|  | S7 | S | 1.167 | 7.500 | 0.051 | 0.036 | 1.287 | 0.895 | 0.070 | R | 0.000 |
|  | S8 | F | 1.167 | 7.500 | 0.051 | 0.036 | 0.281 | 0.889 | 0.070 | R | 0.000 |
| Teng and Chandra (2016) | J1 | S | 1.200 | 10.000 | 0.017 | 0.017 | 0.237 | 0.149 | 0.050 | F | 0.306 |
|  | J2 | S | 1.200 | 10.000 | 0.045 | 0.018 | 0.253 | 0.159 | 0.050 | F | 0.306 |
|  | J3 | S | 1.200 | 10.000 | 0.015 | 0.039 | 0.221 | 0.132 | 0.050 | F | 0.306 |
|  | J4 | FS | 1.200 | 10.000 | 0.018 | 0.018 | 0.467 | 0.186 | 0.050 | B | 0.302 |
|  | J5 | S | 2.200 | 10.000 | 0.017 | 0.017 | 0.237 | 0.149 | 0.050 | F | 0.306 |
|  | J6 | S | 2.200 | 10.000 | 0.045 | 0.018 | 0.253 | 0.159 | 0.050 | F | 0.306 |
|  | J7 | S | 2.200 | 10.000 | 0.015 | 0.039 | 0.221 | 0.132 | 0.050 | F | 0.306 |
| Oesterle et al. (1976) | R1 | F | 2.400 | 18.750 | 0.029 | 0.036 | 0.168 | 0.002 | 0.000 | R | 0.000 |
|  | R2 | F | 2.400 | 18.750 | 0.029 | 0.036 | 0.387 | 0.239 | 0.000 | R | 0.000 |
|  | B1 | F | 2.400 | 18.750 | 0.028 | 0.030 | 0.094 | 0.003 | 0.000 | B | 0.292 |
|  | B3 | F | 2.400 | 18.750 | 0.029 | 0.031 | 0.103 | 0.129 | 0.000 | B | 0.292 |
|  | B4 | F | 2.400 | 18.750 | 0.032 | 0.035 | 0.111 | 0.143 | 0.000 | B | 0.292 |
|  | B2 | FS | 2.400 | 18.750 | 0.029 | 0.063 | 0.281 | 0.003 | 0.000 | B | 0.292 |
|  | B5 | FS | 2.400 | 18.750 | 0.032 | 0.070 | 0.359 | 0.149 | 0.000 | B | 0.292 |
|  | F1 | FS | 2.400 | 18.750 | 0.041 | 0.097 | 0.450 | 0.196 | 0.000 | F | 0.259 |
| Oesterle et al. (1979) | B6 | FS | 2.400 | 18.750 | 0.068 | 0.148 | 0.741 | 0.190 | 0.134 | B | 0.292 |
|  | B7 | FS | 2.400 | 18.750 | 0.029 | 0.063 | 0.341 | 0.134 | 0.076 | B | 0.292 |
|  | B8 | FS | 2.400 | 18.750 | 0.031 | 0.158 | 0.391 | 0.155 | 0.089 | B | 0.292 |
|  | B9 | FS | 2.400 | 18.750 | 0.030 | 0.066 | 0.357 | 0.141 | 0.085 | B | 0.292 |
|  | B10 | F | 2.400 | 18.750 | 0.030 | 0.066 | 0.193 | 0.141 | 0.082 | B | 0.292 |
|  | F2 | FS | 2.400 | 18.750 | 0.029 | 0.064 | 0.442 | 0.145 | 0.073 | F | 0.259 |
| Cheng et al. (2016) | M60 | SL | 1.000 | 10.000 | 0.036 | 0.036 | 0.365 | 0.329 | 0.000 | R | 0.000 |
|  | M115 | SL | 1.000 | 10.000 | 0.031 | 0.031 | 0.359 | 0.585 | 0.000 | R | 0.000 |
|  | H60 | SL | 1.000 | 10.000 | 0.089 | 0.089 | 0.532 | 0.306 | 0.000 | R | 0.000 |
|  | H115 | SL | 1.000 | 10.000 | 0.075 | 0.075 | 0.464 | 0.518 | 0.000 | R | 0.000 |
|  | H60X | SL | 1.000 | 10.000 | 0.093 | 0.093 | 0.557 | 0.159 | 0.000 | R | 0.000 |
| Alarcon et al. (2014) | W1 | F | 2.500 | 7.000 | 0.117 | 0.098 | 0.077 | 0.000 | 0.150 | R | 0.000 |
|  | W2 | F | 2.500 | 7.000 | 0.117 | 0.098 | 0.077 | 0.000 | 0.250 | R | 0.000 |
|  | W3 | F | 2.500 | 7.000 | 0.117 | 0.098 | 0.077 | 0.000 | 0.350 | R | 0.000 |
| Tran (2012) | RW-A20-P10-S38 | FS | 2.000 | 8.020 | 0.026 | 0.030 | 0.324 | 0.142 | 0.073 | R | 0.000 |
|  | RW-A20-P10-S63 | F | 2.000 | 8.020 | 0.056 | 0.056 | 0.698 | 0.118 | 0.073 | R | 0.000 |
|  | RW-A15-P10-S51 | F | 1.500 | 8.020 | 0.030 | 0.034 | 0.312 | 0.137 | 0.077 | R | 0.000 |
|  | RW-A15-P10-S78 | SL | 1.500 | 8.020 | 0.058 | 0.058 | 0.518 | 0.103 | 0.064 | R | 0.000 |
|  | RW-A15-P2.5-S64 | SL | 1.500 | 8.020 | 0.047 | 0.047 | 0.503 | 0.100 | 0.016 | R | 0.000 |
| Hube et al. (2017) | WSL1 | S | 1.094 | 16.000 | 0.031 | 0.042 | 0.030 | 0.167 | 0.000 | R | 0.000 |
|  | WSL2 | SL | 1.094 | 16.000 | 0.031 | 0.042 | 0.030 | 0.063 | 0.000 | R | 0.000 |

**Table S1.** Experimental database for reinforced concrete shear walls (3/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Hube et al. (2017) | WSL3 | S | 1.094 | 16.000 | 0.040 | 0.054 | 0.039 | 0.166 | 0.000 | R | 0.000 |
|  | WSL4 | S | 1.094 | 16.000 | 0.022 | 0.031 | 0.021 | 0.175 | 0.000 | R | 0.000 |
|  | WSL5 | FS | 1.094 | 16.000 | 0.031 | 0.031 | 0.030 | 0.123 | 0.000 | R | 0.000 |
|  | WSL6 | S | 1.094 | 16.000 | 0.022 | 0.022 | 0.021 | 0.123 | 0.000 | R | 0.000 |
|  | WSL7 | S | 1.094 | 18.824 | 0.039 | 0.052 | 0.038 | 0.125 | 0.000 | R | 0.000 |
|  | WSL8 | S | 1.094 | 18.824 | 0.026 | 0.037 | 0.026 | 0.131 | 0.000 | R | 0.000 |
|  | WSL9 | FS | 1.094 | 18.824 | 0.039 | 0.039 | 0.038 | 0.093 | 0.000 | R | 0.000 |
| Liu et al. (2009) | M05C | FS | 2.500 | 13.368 | 0.142 | 0.184 | 0.540 | 0.226 | 0.075 | B | 0.385 |
|  | M10C | FS | 2.500 | 13.368 | 0.124 | 0.178 | 0.441 | 0.218 | 0.061 | B | 0.385 |
|  | M15C | F | 2.500 | 13.368 | 0.088 | 0.116 | 0.290 | 0.225 | 0.043 | B | 0.385 |
|  | M20C | F | 2.500 | 13.368 | 0.049 | 0.083 | 0.189 | 0.077 | 0.026 | B | 0.385 |
| Ghorbani-Renani et al. (2009) | A2C | SL | 2.077 | 6.500 | 0.093 | 0.094 | 0.622 | 0.351 | 0.000 | R | 0.000 |
|  | B2C | F | 2.080 | 6.524 | 0.068 | 0.064 | 0.341 | 0.253 | 0.000 | R | 0.000 |
| Hirosawa (1975) | Endo\_1-3 | FS | 0.833 | 28.125 | 0.038 | 0.034 | 0.112 | 0.054 | 0.053 | B | 0.236 |
|  | Endo\_1-5 | F | 0.389 | 45.000 | 0.189 | 0.182 | 0.112 | 0.244 | 0.067 | B | 0.294 |
|  | Hirosawa\_1-1 | F | 1.167 | 20.000 | 0.029 | 0.026 | 0.223 | 0.008 | 0.000 | B | 0.313 |
|  | Hirosawa\_1-2 | F | 1.167 | 20.000 | 0.025 | 0.023 | 0.193 | 0.007 | 0.036 | B | 0.313 |
|  | Hirosawa\_1-3 | F | 1.167 | 20.000 | 0.025 | 0.023 | 0.195 | 0.007 | 0.073 | B | 0.313 |
|  | Hirosawa\_1-4 | F | 1.167 | 20.000 | 0.026 | 0.024 | 0.204 | 0.007 | 0.153 | B | 0.313 |
|  | Hirosawa\_2-1 | F | 1.167 | 20.000 | 0.034 | 0.034 | 0.288 | 0.009 | 0.000 | B | 0.313 |
|  | Hirosawa\_2-2 | F | 1.167 | 20.000 | 0.034 | 0.034 | 0.288 | 0.009 | 0.000 | B | 0.313 |
|  | Hirosawa\_2-3 | F | 1.167 | 20.000 | 0.023 | 0.021 | 0.176 | 0.006 | 0.066 | B | 0.313 |
|  | Kokusho\_1-1 | S | 0.500 | 14.333 | 0.000 | 0.000 | 0.116 | 0.000 | 0.000 | F | 0.224 |
|  | Kokusho\_1-2 | S | 0.500 | 14.333 | 0.061 | 0.070 | 0.116 | 0.012 | 0.000 | F | 0.224 |
|  | Kokusho\_1-3 | S | 0.500 | 14.333 | 0.081 | 0.093 | 0.154 | 0.015 | 0.000 | F | 0.224 |
|  | Kokusho\_1-4 | S | 0.500 | 14.333 | 0.073 | 0.083 | 0.154 | 0.013 | 0.000 | F | 0.224 |
|  | Kokusho\_1-5 | S | 0.500 | 14.333 | 0.081 | 0.093 | 0.154 | 0.015 | 0.000 | F | 0.224 |
|  | Kokusho\_1-6 | S | 0.500 | 14.333 | 0.085 | 0.097 | 0.161 | 0.016 | 0.000 | F | 0.224 |
|  | Kokusho\_1-7 | S | 0.500 | 14.333 | 0.085 | 0.097 | 0.161 | 0.016 | 0.000 | F | 0.224 |
|  | Kokusho\_2-1 | S | 0.500 | 17.200 | 0.065 | 0.074 | 0.108 | 0.011 | 0.000 | F | 0.242 |
|  | Kokusho\_2-2 | S | 0.500 | 18.696 | 0.106 | 0.121 | 0.159 | 0.016 | 0.000 | F | 0.253 |
|  | Kokusho\_2-3 | S | 0.500 | 17.200 | 0.079 | 0.090 | 0.159 | 0.013 | 0.000 | F | 0.242 |
|  | Kokusho\_2-4 | S | 0.500 | 21.500 | 0.116 | 0.132 | 0.185 | 0.015 | 0.000 | F | 0.270 |
|  | Kokusho\_2-5 | S | 0.500 | 18.696 | 0.114 | 0.119 | 0.143 | 0.012 | 0.000 | F | 0.253 |
|  | Kokusho\_2-6 | S | 0.500 | 17.917 | 0.116 | 0.122 | 0.153 | 0.012 | 0.000 | F | 0.247 |
|  | Kokusho\_3-1 | S | 0.930 | 18.696 | 0.000 | 0.000 | 0.436 | 0.000 | 0.000 | F | 0.253 |
|  | Kokusho\_3-2 | S | 0.930 | 17.917 | 0.000 | 0.000 | 0.436 | 0.000 | 0.000 | F | 0.247 |
|  | Kokusho\_3-3 | S | 0.930 | 15.926 | 0.113 | 0.108 | 0.436 | 0.020 | 0.000 | F | 0.233 |
|  | Kokusho\_3-4 | S | 0.930 | 17.917 | 0.102 | 0.098 | 0.436 | 0.016 | 0.000 | F | 0.247 |

**Table S1.** Experimental database for reinforced concrete shear walls (4/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Hirosawa (1975) | Kokusho\_3-5 | S | 0.930 | 19.545 | 0.100 | 0.096 | 0.382 | 0.014 | 0.000 | F | 0.258 |
|  | Kokusho\_3-6 | S | 0.930 | 26.875 | 0.162 | 0.155 | 0.448 | 0.017 | 0.000 | F | 0.298 |
|  | Kokusho\_3-7 | S | 0.930 | 19.545 | 0.132 | 0.130 | 0.346 | 0.013 | 0.000 | F | 0.258 |
|  | Kokusho\_3-8 | S | 0.930 | 19.545 | 0.141 | 0.139 | 0.368 | 0.014 | 0.000 | F | 0.258 |
|  | Hirosawa\_7-1 | FS | 1.000 | 10.625 | 0.118 | 0.063 | 1.243 | 0.226 | 0.114 | R | 0.000 |
|  | Hirosawa\_7-2 | S | 1.000 | 10.625 | 0.098 | 0.052 | 1.028 | 0.187 | 0.094 | R | 0.000 |
|  | Hirosawa\_7-3 | FS | 1.000 | 10.625 | 0.098 | 0.115 | 1.028 | 0.377 | 0.094 | R | 0.000 |
|  | Hirosawa\_7-4 | F | 1.000 | 10.625 | 0.148 | 0.175 | 1.560 | 0.572 | 0.143 | R | 0.000 |
|  | Hirosawa\_7-5 | FS | 1.000 | 10.625 | 0.138 | 0.305 | 1.454 | 1.050 | 0.133 | R | 0.000 |
|  | Hirosawa\_7-6 | F | 1.000 | 10.625 | 0.111 | 0.245 | 1.168 | 0.843 | 0.107 | R | 0.000 |
|  | Hirosawa\_8-1 | F | 1.000 | 10.625 | 0.098 | 0.123 | 0.461 | 0.376 | 0.094 | R | 0.000 |
|  | Hirosawa\_8-2 | FS | 1.000 | 10.625 | 0.148 | 0.187 | 0.700 | 0.571 | 0.143 | R | 0.000 |
|  | Hirosawa\_8-3 | F | 1.000 | 10.625 | 0.138 | 0.305 | 0.652 | 1.050 | 0.133 | R | 0.000 |
|  | Hirosawa\_8-4 | F | 1.000 | 10.625 | 0.111 | 0.245 | 0.524 | 0.843 | 0.107 | R | 0.000 |
|  | Hirosawa\_9-1 | F | 2.000 | 5.313 | 0.078 | 0.115 | 1.811 | 0.377 | 0.094 | R | 0.000 |
|  | Hirosawa\_9-2 | F | 2.000 | 5.313 | 0.091 | 0.135 | 2.116 | 0.440 | 0.110 | R | 0.000 |
|  | Hirosawa\_9-3 | F | 2.000 | 5.313 | 0.091 | 0.252 | 1.789 | 0.867 | 0.110 | R | 0.000 |
|  | Hirosawa\_9-4 | F | 2.000 | 5.313 | 0.078 | 0.215 | 1.531 | 0.742 | 0.094 | R | 0.000 |
|  | Tanabe\_1-1 | S | 0.786 | 42.000 | 0.000 | 0.000 | 0.349 | 0.000 | 0.000 | B | 0.308 |
|  | Tanabe\_1-2 | S | 0.786 | 21.000 | 0.000 | 0.000 | 0.349 | 0.000 | 0.000 | B | 0.222 |
|  | Tanabe\_1-3 | S | 0.786 | 10.500 | 0.000 | 0.000 | 0.498 | 0.000 | 0.000 | B | 0.100 |
|  | Tanabe\_2-1 | S | 0.842 | 28.500 | 0.000 | 0.000 | 0.540 | 0.000 | 0.000 | B | 0.222 |
|  | Tanabe\_2-2 | S | 0.842 | 19.000 | 0.000 | 0.000 | 0.538 | 0.000 | 0.000 | B | 0.174 |
|  | Tanabe\_2-3 | S | 0.842 | 14.250 | 0.000 | 0.000 | 0.519 | 0.000 | 0.000 | B | 0.143 |
|  | Tanabe\_2-4 | S | 0.842 | 57.000 | 0.327 | 0.327 | 0.541 | 0.014 | 0.000 | B | 0.308 |
|  | Tanabe\_2-5 | S | 0.842 | 28.500 | 0.152 | 0.152 | 0.504 | 0.013 | 0.000 | B | 0.222 |
|  | Tanabe\_2-6 | S | 0.842 | 28.500 | 0.173 | 0.173 | 0.574 | 0.015 | 0.000 | B | 0.222 |
|  | Tanabe\_2-7 | S | 0.842 | 28.500 | 0.149 | 0.149 | 0.495 | 0.013 | 0.000 | B | 0.222 |
|  | Tanabe\_2-8 | S | 0.842 | 19.000 | 0.097 | 0.097 | 0.485 | 0.013 | 0.000 | B | 0.174 |
|  | Tanabe\_2-9 | S | 0.842 | 19.000 | 0.101 | 0.101 | 0.504 | 0.013 | 0.000 | B | 0.174 |
|  | Tanabe\_2-10 | S | 0.842 | 19.000 | 0.103 | 0.103 | 0.511 | 0.013 | 0.000 | B | 0.174 |
|  | Tanabe\_2-11 | S | 0.842 | 14.250 | 0.080 | 0.080 | 0.527 | 0.014 | 0.000 | B | 0.143 |
|  | Tanabe\_2-12 | S | 0.842 | 14.250 | 0.074 | 0.074 | 0.489 | 0.013 | 0.000 | B | 0.143 |
|  | Tanabe\_2-13 | S | 0.842 | 14.250 | 0.073 | 0.073 | 0.482 | 0.012 | 0.000 | B | 0.143 |
|  | Tanabe\_3-1 | S | 0.842 | 57.000 | 0.117 | 0.117 | 0.300 | 0.010 | 0.000 | B | 0.308 |
|  | Tanabe\_3-2 | S | 0.842 | 57.000 | 0.124 | 0.124 | 0.317 | 0.011 | 0.000 | B | 0.308 |
|  | Tanabe\_3-3 | S | 0.842 | 28.500 | 0.125 | 0.125 | 0.320 | 0.011 | 0.000 | B | 0.222 |
|  | Tanabe\_3-4 | S | 0.842 | 28.500 | 0.110 | 0.110 | 0.282 | 0.009 | 0.000 | B | 0.222 |
|  | Tanabe\_3-5 | S | 0.842 | 19.000 | 0.090 | 0.090 | 0.344 | 0.012 | 0.000 | B | 0.174 |

**Table S1.** Experimental database for reinforced concrete shear walls (5/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Hirosawa (1975) | Tanabe\_3-6 | S | 0.842 | 19.000 | 0.078 | 0.078 | 0.298 | 0.010 | 0.000 | B | 0.174 |
|  | Tanabe\_3-7 | S | 0.842 | 14.250 | 0.060 | 0.060 | 0.303 | 0.010 | 0.000 | B | 0.143 |
|  | Tanabe\_3-8 | S | 0.842 | 14.250 | 0.064 | 0.064 | 0.323 | 0.011 | 0.000 | B | 0.143 |
|  | Tanabe\_4-1 | S | 0.842 | 57.000 | 0.155 | 0.155 | 0.297 | 0.010 | 0.000 | B | 0.308 |
|  | Tanabe\_4-2 | S | 0.842 | 57.000 | 0.153 | 0.153 | 0.294 | 0.010 | 0.000 | B | 0.308 |
|  | Tanabe\_4-3 | S | 0.842 | 57.000 | 0.157 | 0.157 | 0.301 | 0.010 | 0.000 | B | 0.308 |
|  | Tanabe\_4-4 | S | 0.842 | 28.500 | 0.181 | 0.181 | 0.315 | 0.012 | 0.000 | B | 0.222 |
|  | Tanabe\_4-5 | S | 0.842 | 28.500 | 0.180 | 0.180 | 0.313 | 0.012 | 0.000 | B | 0.222 |
|  | Tanabe\_4-6 | S | 0.842 | 28.500 | 0.175 | 0.175 | 0.305 | 0.011 | 0.000 | B | 0.222 |
|  | Tanabe\_4-7 | S | 0.842 | 19.000 | 0.116 | 0.116 | 0.303 | 0.011 | 0.000 | B | 0.174 |
|  | Tanabe\_4-8 | S | 0.842 | 19.000 | 0.122 | 0.122 | 0.319 | 0.012 | 0.000 | B | 0.174 |
|  | Tanabe\_4-9 | S | 0.842 | 19.000 | 0.119 | 0.119 | 0.310 | 0.011 | 0.000 | B | 0.174 |
|  | Tanabe\_4-10 | S | 0.842 | 14.250 | 0.090 | 0.090 | 0.314 | 0.012 | 0.000 | B | 0.143 |
|  | Tanabe\_4-11 | S | 0.842 | 14.250 | 0.090 | 0.090 | 0.315 | 0.012 | 0.000 | B | 0.143 |
|  | Tanabe\_4-12 | S | 0.842 | 14.250 | 0.097 | 0.097 | 0.337 | 0.012 | 0.000 | B | 0.143 |
|  | Sugano\_2-1 | S | 0.409 | 33.000 | 0.183 | 0.183 | 0.341 | 0.016 | 0.000 | B | 0.200 |
|  | Sugano\_2-2 | S | 0.409 | 33.000 | 0.181 | 0.181 | 0.338 | 0.016 | 0.000 | B | 0.200 |
|  | Sugano\_2-3 | S | 0.409 | 33.000 | 0.177 | 0.177 | 0.330 | 0.015 | 0.000 | B | 0.200 |
|  | Sugano\_2-4 | S | 0.409 | 33.000 | 0.093 | 0.096 | 0.358 | 0.017 | 0.000 | B | 0.200 |
|  | Sugano\_2-5 | S | 0.409 | 33.000 | 0.091 | 0.091 | 0.338 | 0.016 | 0.000 | B | 0.200 |
|  | Sugano\_2-6 | S | 0.409 | 33.000 | 0.096 | 0.091 | 0.343 | 0.008 | 0.000 | B | 0.200 |
|  | Sugano\_2-7 | S | 0.409 | 33.000 | 0.100 | 0.096 | 0.358 | 0.008 | 0.000 | B | 0.200 |
|  | Sugano\_2-8 | S | 0.409 | 33.000 | 0.146 | 0.141 | 0.336 | 0.011 | 0.000 | B | 0.200 |
| Dazio et al. (2009) | WSH1 | F | 2.280 | 13.333 | 0.039 | 0.032 | 0.161 | 0.137 | 0.051 | R | 0.000 |
|  | WSH2 | F | 2.280 | 13.333 | 0.036 | 0.030 | 0.190 | 0.131 | 0.057 | R | 0.000 |
|  | WSH3 | F | 2.280 | 13.333 | 0.078 | 0.031 | 0.236 | 0.125 | 0.058 | R | 0.000 |
|  | WSH4 | F | 2.280 | 13.333 | 0.076 | 0.032 | 0.217 | 0.000 | 0.057 | R | 0.000 |
|  | WSH5 | F | 2.280 | 13.333 | 0.037 | 0.034 | 0.102 | 0.159 | 0.128 | R | 0.000 |
|  | WSH6 | F | 2.260 | 13.333 | 0.069 | 0.028 | 0.195 | 0.168 | 0.108 | R | 0.000 |
| Villalobos (2014) | WMCC | F | 2.175 | 7.500 | 0.057 | 0.095 | 0.737 | 0.213 | 0.094 | R | 0.000 |
|  | WMCN | F | 2.175 | 7.500 | 0.057 | 0.096 | 0.747 | 0.000 | 0.095 | R | 0.000 |
|  | W60N | FS | 2.175 | 7.500 | 0.051 | 0.086 | 0.670 | 0.000 | 0.085 | R | 0.000 |
|  | W60C | FS | 2.175 | 7.500 | 0.055 | 0.093 | 0.721 | 0.208 | 0.091 | R | 0.000 |
|  | W40C | FS | 2.175 | 7.500 | 0.056 | 0.094 | 0.730 | 0.211 | 0.093 | R | 0.000 |
|  | W60N2 | FS | 2.175 | 7.500 | 0.055 | 0.079 | 0.725 | 0.000 | 0.091 | R | 0.000 |
| Zhang and Wang (2000) | SW7 | F | 2.143 | 7.000 | 0.056 | 0.084 | 0.097 | 0.995 | 0.194 | R | 0.000 |
|  | SW8 | F | 2.143 | 7.000 | 0.051 | 0.077 | 0.070 | 0.910 | 0.279 | R | 0.000 |
|  | SW9 | F | 2.143 | 7.000 | 0.047 | 0.071 | 0.157 | 0.566 | 0.197 | R | 0.000 |
|  | SRCW12 | F | 2.143 | 7.000 | 0.059 | 0.089 | 0.190 | 0.703 | 0.283 | R | 0.000 |

**Table S1.** Experimental database for reinforced concrete shear walls (6/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Hube et al. (2014) | W4 | FS | 2.500 | 9.333 | 0.109 | 0.088 | 0.084 | 0.000 | 0.150 | R | 0.000 |
|  | W5 | F | 1.900 | 7.000 | 0.117 | 0.098 | 0.077 | 0.000 | 0.150 | R | 0.000 |
|  | W6 | F | 2.500 | 7.000 | 0.218 | 0.098 | 0.000 | 0.000 | 0.150 | R | 0.000 |
|  | W7 | F | 2.500 | 7.000 | 0.117 | 0.098 | 0.077 | 0.000 | 0.150 | R | 0.000 |
|  | W8 | F | 2.500 | 7.000 | 0.117 | 0.142 | 0.077 | 0.258 | 0.150 | R | 0.000 |
|  | W9 | F | 2.500 | 7.000 | 0.117 | 0.124 | 0.077 | 0.000 | 0.150 | R | 0.000 |
| Hidalgo et al. (2002) | 1 | S | 1.000 | 8.333 | 0.051 | 0.026 | 0.954 | 0.026 | 0.000 | R | 0.000 |
|  | 2 | S | 1.000 | 8.333 | 0.051 | 0.051 | 0.969 | 0.051 | 0.000 | R | 0.000 |
|  | 4 | S | 1.000 | 8.333 | 0.052 | 0.078 | 1.212 | 0.078 | 0.000 | R | 0.000 |
|  | 6 | S | 0.692 | 10.833 | 0.046 | 0.023 | 0.842 | 0.023 | 0.000 | R | 0.000 |
|  | 7 | S | 0.692 | 10.833 | 0.034 | 0.065 | 1.229 | 0.065 | 0.000 | R | 0.000 |
|  | 8 | S | 0.692 | 10.833 | 0.078 | 0.075 | 1.417 | 0.075 | 0.000 | R | 0.000 |
|  | 9 | FS | 0.692 | 13.000 | 0.054 | 0.054 | 1.262 | 0.054 | 0.000 | R | 0.000 |
|  | 10 | FS | 0.692 | 16.250 | 0.056 | 0.056 | 1.772 | 0.056 | 0.000 | R | 0.000 |
|  | 11 | FS | 0.500 | 14.000 | 0.058 | 0.029 | 1.184 | 0.029 | 0.000 | R | 0.000 |
|  | 12 | FS | 0.500 | 14.000 | 0.028 | 0.056 | 1.148 | 0.056 | 0.000 | R | 0.000 |
|  | 13 | FS | 0.500 | 14.000 | 0.053 | 0.053 | 1.090 | 0.053 | 0.000 | R | 0.000 |
|  | 14 | FS | 0.353 | 21.250 | 0.054 | 0.028 | 1.338 | 0.028 | 0.000 | R | 0.000 |
|  | 15 | FS | 0.353 | 21.250 | 0.025 | 0.048 | 1.204 | 0.048 | 0.000 | R | 0.000 |
|  | 16 | FS | 0.353 | 21.250 | 0.049 | 0.049 | 1.217 | 0.049 | 0.000 | R | 0.000 |
|  | 21 | FS | 0.692 | 13.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | R | 0.000 |
|  | 22 | FS | 0.692 | 13.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | R | 0.000 |
|  | 23 | FS | 0.692 | 13.000 | 0.000 | 0.045 | 0.000 | 0.045 | 0.000 | R | 0.000 |
|  | 24 | FS | 0.692 | 13.000 | 0.045 | 0.000 | 0.721 | 0.000 | 0.000 | R | 0.000 |
|  | 25 | FS | 0.500 | 14.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | R | 0.000 |
|  | 26 | FS | 0.500 | 14.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | R | 0.000 |
|  | 27 | FS | 0.500 | 14.000 | 0.000 | 0.045 | 0.000 | 0.045 | 0.000 | R | 0.000 |
|  | 28 | FS | 0.500 | 14.000 | 0.046 | 0.000 | 0.740 | 0.000 | 0.000 | R | 0.000 |
|  | 29 | FS | 0.350 | 18.750 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | R | 0.000 |
|  | 30 | FS | 0.350 | 18.750 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | R | 0.000 |
|  | 31 | FS | 0.350 | 18.750 | 0.000 | 0.047 | 0.000 | 0.047 | 0.000 | R | 0.000 |
|  | 32 | FS | 0.350 | 18.750 | 0.046 | 0.000 | 1.156 | 0.000 | 0.000 | R | 0.000 |
| Han et al. (2002) | W2 | F | 2.000 | 7.500 | 0.031 | 0.027 | 0.147 | 0.097 | 0.100 | R | 0.000 |
|  | W3 | F | 3.000 | 7.500 | 0.029 | 0.025 | 0.136 | 0.090 | 0.100 | R | 0.000 |
| Barda et al. (1977) | B1-1 | FS | 0.500 | 18.750 | 0.093 | 0.085 | 0.326 | 0.062 | 0.000 | F | 0.209 |
|  | B2-1 | S | 0.500 | 18.750 | 0.169 | 0.153 | 1.908 | 0.112 | 0.000 | F | 0.209 |
|  | B3-2 | S | 0.500 | 18.750 | 0.101 | 0.095 | 0.627 | 0.069 | 0.000 | F | 0.209 |
|  | B4-3 | S | 0.500 | 18.750 | 0.141 | 0.000 | 1.137 | 0.000 | 0.000 | F | 0.209 |
|  | B5-4 | S | 0.500 | 18.750 | 0.000 | 0.086 | 0.746 | 0.063 | 0.000 | F | 0.209 |

**Table S1.** Experimental database for reinforced concrete shear walls (7/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Barda et al. (1977) | B6-4 | S | 0.500 | 18.750 | 0.058 | 0.117 | 1.021 | 0.085 | 0.000 | F | 0.209 |
|  | B7-5 | S | 0.250 | 18.750 | 0.103 | 0.097 | 0.860 | 0.071 | 0.000 | F | 0.209 |
|  | B8-5 | S | 1.000 | 18.750 | 0.113 | 0.106 | 0.855 | 0.077 | 0.000 | F | 0.209 |
| SLDRCE (2008) | Jiang\_SSW-2 | SL | 0.560 | 24.881 | 0.161 | 0.179 | 0.503 | 0.195 | 0.098 | R | 0.000 |
|  | Jiang\_SSW-3 | SL | 0.560 | 24.881 | 0.157 | 0.179 | 0.800 | 0.195 | 0.196 | R | 0.000 |
|  | Zhou\_SW1 | F | 2.611 | 12.000 | 0.080 | 0.096 | 0.651 | 0.161 | 0.197 | R | 0.000 |
|  | Zhou\_SW2 | FS | 2.611 | 12.000 | 0.080 | 0.096 | 0.651 | 0.161 | 0.000 | R | 0.000 |
|  | Zhang\_SW1-1 | F | 2.200 | 8.000 | 0.087 | 0.093 | 0.323 | 0.145 | 0.108 | R | 0.000 |
|  | Zhang\_SW1-2 | F | 2.200 | 8.000 | 0.087 | 0.093 | 0.323 | 0.145 | 0.216 | R | 0.000 |
|  | Zhang\_SW1-3 | F | 2.200 | 8.000 | 0.087 | 0.093 | 0.323 | 0.145 | 0.324 | R | 0.000 |
|  | Zhang\_SW1-4 | F | 2.200 | 8.000 | 0.087 | 0.093 | 0.323 | 0.145 | 0.433 | R | 0.000 |
|  | Zhang\_SW2-1 | FS | 1.200 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW2-2 | F | 1.700 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW2-3 | F | 2.200 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW3-1 | F | 2.200 | 8.000 | 0.087 | 0.093 | 0.323 | 0.145 | 0.216 | R | 0.000 |
|  | Zhang\_SW3-2 | F | 2.200 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW4-1 | F | 2.200 | 8.000 | 0.058 | 0.062 | 0.155 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW4-2 | F | 2.200 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW4-3 | F | 2.200 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW5-1 | F | 2.200 | 8.000 | 0.070 | 0.062 | 0.173 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW5-2 | F | 2.200 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW5-3 | F | 2.200 | 8.000 | 0.050 | 0.062 | 0.289 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW6-1 | F | 2.200 | 8.000 | 0.058 | 0.020 | 0.217 | 0.031 | 0.417 | R | 0.000 |
|  | Zhang\_SW6-2 | F | 2.200 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
|  | Zhang\_SW6-3 | F | 2.200 | 8.000 | 0.058 | 0.062 | 0.217 | 0.097 | 0.417 | R | 0.000 |
| Greifenhagen and Lestuzzi (2005) | M1 | F | 0.690 | 10.000 | 0.030 | 0.030 | 0.000 | 0.000 | 0.027 | R | 0.000 |
|  | M2 | F | 0.690 | 10.000 | 0.030 | 0.000 | 0.000 | 0.000 | 0.027 | R | 0.000 |
|  | M3 | FS | 0.767 | 11.250 | 0.075 | 0.111 | 0.000 | 0.000 | 0.097 | R | 0.000 |
|  | M4 | F | 0.767 | 11.250 | 0.062 | 0.092 | 0.000 | 0.000 | 0.050 | R | 0.000 |
| Tasnimi (2000) | SHW1 | F | 2.200 | 10.000 | 0.067 | 0.028 | 0.286 | 0.000 | 0.000 | R | 0.000 |
|  | SHW2 | F | 2.200 | 10.000 | 0.067 | 0.028 | 0.286 | 0.000 | 0.000 | R | 0.000 |
|  | SHW3 | F | 2.200 | 10.000 | 0.064 | 0.027 | 0.275 | 0.000 | 0.000 | R | 0.000 |
|  | SHW4 | F | 2.200 | 10.000 | 0.061 | 0.026 | 0.263 | 0.000 | 0.000 | R | 0.000 |
| Aoyama et al. (1984) | P2015 | S | 0.500 | 22.000 | 0.090 | 0.228 | 0.462 | 0.065 | 0.031 | B | 0.154 |
| Chiou et al. (2004) | MWF1 | FS | 0.880 | 20.833 | 0.074 | 0.039 | 0.215 | 0.059 | 0.000 | B | 0.171 |
|  | MWF2 | FS | 0.880 | 20.833 | 0.055 | 0.039 | 0.215 | 0.059 | 0.000 | B | 0.171 |
|  | LWF1 | FS | 0.688 | 26.667 | 0.073 | 0.039 | 0.212 | 0.058 | 0.000 | B | 0.139 |
|  | LWF2 | FS | 0.688 | 26.667 | 0.054 | 0.039 | 0.212 | 0.058 | 0.000 | B | 0.139 |
| Cho et al. (2004) | W3 | F | 3.750 | 6.579 | 0.058 | 0.077 | 0.845 | 0.062 | 0.100 | R | 0.000 |

**Table S1.** Experimental database for reinforced concrete shear walls (8/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Deng et al. (2008) | HPCW-01 | F | 2.100 | 10.000 | 0.015 | 0.039 | 0.215 | 0.029 | 0.163 | R | 0.000 |
|  | HPCW-02 | F | 2.100 | 10.000 | 0.012 | 0.032 | 0.138 | 0.039 | 0.136 | R | 0.000 |
|  | HPCW-03 | F | 2.100 | 10.000 | 0.012 | 0.048 | 0.171 | 0.032 | 0.133 | R | 0.000 |
|  | HPCW-04 | F | 2.100 | 10.000 | 0.006 | 0.042 | 0.117 | 0.034 | 0.117 | R | 0.000 |
| Elnashai and Pinho (1998) | Original | F | 2.083 | 10.000 | 0.052 | 0.101 | 0.236 | 0.406 | 0.000 | R | 0.000 |
| Hsiao et al. (2008) | MW1 | FS | 0.908 | 31.250 | 0.046 | 0.046 | 0.083 | 0.073 | 0.000 | B | 0.443 |
|  | LW1 | FS | 0.649 | 43.750 | 0.048 | 0.048 | 0.087 | 0.021 | 0.000 | B | 0.419 |
| Hwang et al. (2004) | WF-12 | FS | 0.514 | 29.167 | 0.050 | 0.050 | 0.781 | 0.422 | 0.000 | B | 0.250 |
|  | WF-15 | SL | 0.514 | 23.333 | 0.082 | 0.082 | 0.480 | 0.316 | 0.000 | B | 0.222 |
| Kabeyasawa and Matsumoto (1992) | NW-1 | FS | 1.765 | 21.250 | 0.054 | 0.255 | 0.209 | 0.203 | 0.109 | B | 0.217 |
|  | NW-2 | FS | 1.176 | 21.250 | 0.050 | 0.239 | 0.196 | 0.190 | 0.102 | B | 0.217 |
|  | NW-3 | FS | 1.765 | 21.250 | 0.033 | 0.273 | 0.303 | 0.218 | 0.134 | B | 0.217 |
|  | NW-4 | FS | 1.765 | 21.250 | 0.033 | 0.278 | 0.410 | 0.221 | 0.156 | B | 0.217 |
|  | NW-5 | FS | 1.765 | 21.250 | 0.059 | 0.252 | 0.371 | 0.200 | 0.124 | B | 0.217 |
|  | NW-6 | FS | 1.765 | 21.250 | 0.054 | 0.233 | 0.443 | 0.185 | 0.131 | B | 0.217 |
| Kimura and Sugano (1996) | W8N18 | FS | 1.714 | 17.500 | 0.138 | 0.138 | 0.188 | 0.132 | 0.152 | B | 0.250 |
|  | W8N13 | FS | 1.714 | 17.500 | 0.127 | 0.127 | 0.173 | 0.121 | 0.101 | B | 0.250 |
|  | W8N08H | FS | 1.714 | 17.500 | 0.127 | 0.126 | 0.172 | 0.121 | 0.062 | B | 0.250 |
|  | W4N18 | FS | 1.714 | 17.500 | 0.233 | 0.232 | 0.318 | 0.223 | 0.256 | B | 0.250 |
|  | W4N18C | FS | 1.714 | 17.500 | 0.237 | 0.236 | 0.322 | 0.324 | 0.260 | B | 0.250 |
| Lombard et al. (2000) | 1 | F | 1.333 | 15.000 | 0.080 | 0.050 | 0.080 | 0.050 | 0.000 | R | 0.000 |
| Lopes et al. (2001) | SW13 | FS | 1.100 | 10.000 | 0.027 | 0.035 | 0.537 | 0.140 | 0.000 | R | 0.000 |
| Massone et al. (2009) | WS-T1-S1 | S | 1.000 | 10.000 | 0.071 | 0.047 | 0.548 | 0.000 | 0.000 | R | 0.000 |
|  | WS-T4-S2 | SL | 1.000 | 10.000 | 0.028 | 0.030 | 0.142 | 0.000 | 0.000 | R | 0.000 |
|  | WP-T5-N10-S2 | FS | 0.891 | 9.013 | 0.031 | 0.038 | 0.180 | 0.000 | 0.000 | R | 0.000 |
| Nakamura et al. (2009) | I-1 | SL | 0.744 | 14.333 | 0.087 | 0.087 | 0.087 | 0.087 | 0.050 | F | 0.260 |
|  | I-2 | SL | 0.744 | 14.333 | 0.110 | 0.110 | 0.110 | 0.110 | 0.047 | F | 0.260 |
| Oh et al. (2006) | HRI-W2 | F | 1.500 | 7.500 | 0.032 | 0.028 | 0.167 | 0.099 | 0.081 | R | 0.000 |
|  | HRI-W5 | F | 1.500 | 7.500 | 0.030 | 0.026 | 0.158 | 0.186 | 0.076 | R | 0.000 |
|  | HRI-W7 | F | 1.500 | 12.000 | 0.037 | 0.028 | 0.100 | 0.095 | 0.082 | B | 0.237 |
| Oh et al. (2002) | WR-0 | F | 1.500 | 7.500 | 0.033 | 0.029 | 0.173 | 0.000 | 0.084 | R | 0.000 |
| Palermo and Vecchio (2002) | DP1 | SL | 0.811 | 38.467 | 0.220 | 0.204 | 0.089 | 0.028 | 0.070 | F | 0.364 |
|  | DP2 | SL | 0.811 | 38.467 | 0.254 | 0.235 | 0.097 | 0.032 | 0.077 | F | 0.369 |
| Paulay et al. (1982) | wall 1 | SL | 0.567 | 30.000 | 0.092 | 0.225 | 0.368 | 0.225 | 0.101 | R | 0.000 |
| Sittipunt and Wood (2004) | W1 | S | 1.433 | 15.000 | 0.048 | 0.063 | 0.296 | 0.028 | 0.000 | B | 0.278 |
|  | W2 | S | 1.433 | 15.000 | 0.065 | 0.098 | 0.303 | 0.029 | 0.000 | B | 0.278 |
| Taylor et al. (1996) | RW2 | F | 3.123 | 11.961 | 0.050 | 0.074 | 0.552 | 0.042 | 0.100 | R | 0.000 |
| Tokunaga and Nakachi (2012) | No3 | FS | 1.860 | 4.778 | 0.187 | 0.070 | 0.000 | 0.000 | 0.200 | R | 0.000 |
|  | No4 | FS | 1.860 | 4.778 | 0.352 | 0.133 | 0.000 | 0.000 | 0.400 | R | 0.000 |

**Table S1.** Experimental database for reinforced concrete shear walls (9/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Tokunaga and Nakachi (2012) | H1 | FS | 1.860 | 4.778 | 0.320 | 0.121 | 0.000 | 0.000 | 0.400 | R | 0.000 |
| Tomazevic et al. (1996) | SW00N1 | FS | 1.701 | 19.400 | 0.030 | 0.030 | 0.000 | 0.000 | 0.051 | R | 0.000 |
|  | SW00N2 | FS | 1.701 | 19.400 | 0.030 | 0.030 | 0.000 | 0.000 | 0.102 | R | 0.000 |
|  | SW23N1 | FS | 1.701 | 19.400 | 0.023 | 0.023 | 0.226 | 0.000 | 0.038 | R | 0.000 |
|  | SW23N2 | FS | 1.701 | 19.400 | 0.023 | 0.023 | 0.226 | 0.000 | 0.077 | R | 0.000 |
|  | SW23C1 | FS | 1.701 | 19.400 | 0.030 | 0.030 | 0.301 | 0.017 | 0.051 | R | 0.000 |
|  | SW23C2 | FS | 1.701 | 19.400 | 0.030 | 0.030 | 0.301 | 0.017 | 0.102 | R | 0.000 |
|  | SW60N1 | FS | 1.701 | 19.400 | 0.043 | 0.043 | 0.679 | 0.000 | 0.051 | R | 0.000 |
|  | SW60N2 | FS | 1.701 | 19.400 | 0.043 | 0.043 | 0.679 | 0.000 | 0.102 | R | 0.000 |
|  | SW60C1 | FS | 1.701 | 19.400 | 0.043 | 0.043 | 0.679 | 0.017 | 0.051 | R | 0.000 |
|  | SW60C2 | FS | 1.701 | 19.400 | 0.043 | 0.043 | 0.679 | 0.017 | 0.102 | R | 0.000 |
| Wallace et al. (2008) | P0.05 | FS | 0.445 | 9.013 | 0.034 | 0.037 | 0.178 | 0.000 | 0.050 | R | 0.000 |
| Su and Wong (2007) | W1 | F | 4.100 | 5.000 | 0.161 | 0.019 | 0.000 | 0.000 | 0.250 | R | 0.000 |
|  | W2 | F | 4.100 | 5.000 | 0.194 | 0.022 | 0.000 | 0.000 | 0.499 | R | 0.000 |
|  | W3 | F | 4.100 | 5.000 | 0.189 | 0.044 | 0.000 | 0.000 | 0.487 | R | 0.000 |
| Dabbagh (2005) | SW1 | S | 1.100 | 13.333 | 0.031 | 0.031 | 0.400 | 0.006 | 0.103 | F | 0.278 |
|  | SW2 | SL | 1.100 | 13.333 | 0.075 | 0.075 | 0.400 | 0.013 | 0.112 | F | 0.278 |
|  | SW3 | S | 1.100 | 13.333 | 0.042 | 0.045 | 0.358 | 0.008 | 0.093 | F | 0.278 |
|  | SW4 | S | 1.100 | 13.333 | 0.042 | 0.045 | 0.358 | 0.008 | 0.000 | F | 0.278 |
|  | SW5 | S | 1.100 | 13.333 | 0.078 | 0.032 | 0.414 | 0.006 | 0.107 | F | 0.278 |
|  | SW6 | S | 1.100 | 13.333 | 0.060 | 0.060 | 0.414 | 0.010 | 0.107 | F | 0.278 |
| Gebreyohaness et al. (2014) | WPS1 | S | 1.346 | 8.667 | 0.058 | 0.052 | 0.000 | 0.000 | 0.056 | R | 0.000 |
|  | WPS2 | S | 1.346 | 5.652 | 0.019 | 0.017 | 0.000 | 0.000 | 0.048 | R | 0.000 |
|  | WPS3 | S | 0.923 | 8.667 | 0.036 | 0.030 | 0.277 | 0.000 | 0.000 | R | 0.000 |
|  | WPS4 | FS | 0.923 | 5.652 | 0.028 | 0.024 | 0.264 | 0.000 | 0.000 | R | 0.000 |
|  | WPS9 | S | 0.923 | 8.667 | 0.049 | 0.041 | 0.209 | 0.000 | 0.051 | R | 0.000 |
|  | WPS10 | FS | 0.923 | 5.652 | 0.033 | 0.028 | 0.218 | 0.000 | 0.052 | R | 0.000 |
|  | WSS1 | S | 0.800 | 6.667 | 0.038 | 0.038 | 0.240 | 0.000 | 0.000 | R | 0.000 |
|  | WSS2 | S | 0.800 | 4.348 | 0.021 | 0.021 | 0.210 | 0.000 | 0.000 | R | 0.000 |
| Jiang et al. (2013) | SW1 | F | 2.000 | 10.000 | 0.103 | 0.106 | 0.194 | 0.357 | 0.100 | F | 0.278 |
|  | SW2 | F | 2.000 | 10.000 | 0.103 | 0.106 | 0.194 | 0.357 | 0.200 | F | 0.278 |
|  | SW3 | F | 2.000 | 10.000 | 0.103 | 0.106 | 0.194 | 0.357 | 0.300 | F | 0.278 |
|  | SW4 | F | 2.000 | 10.000 | 0.103 | 0.106 | 0.194 | 0.542 | 0.300 | F | 0.278 |
|  | SW5 | F | 2.000 | 10.000 | 0.103 | 0.106 | 0.194 | 0.178 | 0.300 | F | 0.278 |
|  | SW7 | F | 2.000 | 10.000 | 0.103 | 0.106 | 0.235 | 0.442 | 0.300 | R | 0.000 |
| Kuang and Ho (2008) | U1.0 | F | 1.000 | 12.000 | 0.000 | 0.180 | 0.157 | 0.000 | 0.000 | R | 0.000 |
|  | U1.5 | F | 1.500 | 12.000 | 0.000 | 0.156 | 0.137 | 0.000 | 0.000 | R | 0.000 |
|  | C1.0 | F | 1.000 | 12.000 | 0.000 | 0.155 | 0.325 | 0.000 | 0.000 | R | 0.000 |
|  | C1.5 | F | 1.500 | 12.000 | 0.000 | 0.160 | 0.335 | 0.000 | 0.000 | R | 0.000 |

**Table S1.** Experimental database for reinforced concrete shear walls (10/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Kuang and Ho (2008) | U1.0-BC | F | 1.000 | 12.000 | 0.000 | 0.174 | 0.153 | 0.349 | 0.000 | R | 0.000 |
|  | U1.5-BC | F | 1.500 | 12.000 | 0.000 | 0.162 | 0.142 | 0.323 | 0.000 | R | 0.000 |
|  | U1.0-BC2 | F | 1.000 | 12.000 | 0.000 | 0.160 | 0.140 | 0.320 | 0.000 | R | 0.000 |
|  | U1.0-CT | F | 1.000 | 12.000 | 0.000 | 0.145 | 0.127 | 0.000 | 0.000 | R | 0.000 |
| Gupta and Rangan (1998) | S-F | F | 1.100 | 13.333 | 0.071 | 0.050 | 0.060 | 0.024 | 0.000 | F | 0.278 |
|  | S-1 | S | 1.100 | 13.333 | 0.054 | 0.038 | 0.087 | 0.019 | 0.057 | F | 0.278 |
|  | S-2 | S | 1.100 | 13.333 | 0.066 | 0.046 | 0.145 | 0.023 | 0.140 | F | 0.278 |
|  | S-3 | S | 1.100 | 13.333 | 0.063 | 0.044 | 0.170 | 0.021 | 0.000 | F | 0.278 |
|  | S-4 | S | 1.100 | 13.333 | 0.095 | 0.040 | 0.131 | 0.020 | 0.060 | F | 0.278 |
|  | S-5 | S | 1.100 | 13.333 | 0.098 | 0.041 | 0.165 | 0.020 | 0.125 | F | 0.278 |
|  | S-6 | S | 1.100 | 13.333 | 0.101 | 0.043 | 0.189 | 0.021 | 0.064 | F | 0.278 |
|  | S-7 | S | 1.100 | 13.333 | 0.061 | 0.042 | 0.132 | 0.021 | 0.032 | F | 0.278 |
| Yuan et al. (2018) | SW-1 | F | 2.000 | 6.400 | 0.040 | 0.039 | 0.038 | 0.095 | 0.130 | R | 0.000 |
|  | SW-2 | F | 2.000 | 6.400 | 0.073 | 0.084 | 0.038 | 0.095 | 0.130 | R | 0.000 |
| Yanez et al. (1991) | S1 | F | 1.250 | 16.667 | 0.070 | 0.056 | 0.070 | 0.056 | 0.000 | R | 0.000 |
| Terzioglu et al. (2018) | T2-S2-3 | FS | 0.647 | 12.500 | 0.116 | 0.127 | 0.878 | 0.127 | 0.000 | R | 0.000 |
|  | T1-S2-9 | FS | 0.633 | 12.500 | 0.067 | 0.083 | 1.015 | 0.083 | 0.000 | R | 0.000 |
|  | T1-N10-S1-11 | FS | 0.633 | 12.500 | 0.060 | 0.074 | 0.902 | 0.074 | 0.099 | R | 0.000 |
|  | T1-S1-2 | FS | 0.633 | 12.500 | 0.063 | 0.069 | 0.956 | 0.069 | 0.000 | R | 0.000 |
| Abdulridha and Palermo (2017) | W1-SR | F | 2.400 | 6.667 | 0.123 | 0.123 | 0.185 | 0.293 | 0.000 | R | 0.000 |
| Christidis and Trezos (2017) | W7 | F | 2.000 | 6.000 | 0.270 | 0.126 | 0.458 | 1.264 | 0.000 | R | 0.000 |
|  | W9 | FS | 2.000 | 6.000 | 0.225 | 0.038 | 0.225 | 0.000 | 0.000 | R | 0.000 |
|  | W11 | FS | 2.000 | 6.000 | 0.225 | 0.021 | 0.225 | 0.000 | 0.000 | R | 0.000 |
|  | W13 | FS | 2.000 | 6.000 | 0.276 | 0.026 | 0.276 | 0.000 | 0.000 | R | 0.000 |
| Ren et al. (2018) | RC-W | F | 2.054 | 5.139 | 0.018 | 0.042 | 0.290 | 0.063 | 0.180 | R | 0.000 |
| Qiao et al. (2017) | W1 | F | 0.850 | 6.250 | 0.051 | 0.051 | 0.100 | 0.049 | 0.024 | R | 0.000 |
| Shen et al. (2008) | SHW0 | F | 1.750 | 8.333 | 0.045 | 0.043 | 0.185 | 0.087 | 0.086 | R | 0.000 |
| Mohamed et al. (2014) | ST15 | F | 2.333 | 7.500 | 0.023 | 0.064 | 0.051 | 0.064 | 0.070 | R | 0.000 |
| Ghazizadeh and Cruz-Noguez (2018) | Control Wall | F | 1.083 | 12.000 | 0.038 | 0.031 | 0.038 | 0.202 | 0.000 | R | 0.000 |
| Aanasopoulou (2010) | S1 | F | 1.200 | 10.059 | 0.065 | 0.065 | 0.038 | 0.461 | 0.000 | R | 0.000 |
|  | S4 | SL | 1.200 | 10.059 | 0.073 | 0.073 | 0.063 | 0.831 | 0.000 | R | 0.000 |
|  | S6 | F | 1.500 | 10.059 | 0.066 | 0.066 | 0.066 | 0.868 | 0.000 | R | 0.000 |
|  | S9 | F | 1.500 | 10.059 | 0.063 | 0.063 | 0.101 | 1.220 | 0.000 | R | 0.000 |
|  | S10 | F | 1.500 | 10.059 | 0.053 | 0.053 | 0.098 | 1.164 | 0.000 | R | 0.000 |
| Alltin et al. (2013) | Specimen 1 | S | 1.650 | 10.000 | 0.384 | 0.031 | 2.646 | 0.031 | 0.000 | R | 0.000 |
| Zhu and Guo (2017) | MW | F | 2.024 | 8.500 | 0.043 | 0.046 | 0.249 | 0.140 | 0.079 | R | 0.000 |
| Mansur et al. (1992) | W2 | FS | 0.675 | 16.667 | 0.076 | 0.076 | 0.460 | 0.078 | 0.000 | B | 0.227 |
|  | W3 | FS | 0.675 | 16.667 | 0.076 | 0.076 | 0.461 | 0.078 | 0.000 | B | 0.227 |
|  | W4 | FS | 0.675 | 16.667 | 0.007 | 0.007 | 0.386 | 0.055 | 0.000 | B | 0.227 |

**Table S1.** Experimental database for reinforced concrete shear walls (11/11)

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference | Specimen | Failure | *M*/*Vlw* | *lw*/*tw* | *ρvwfy,vw*/*fc'* | *ρhwfy,hw*/*fc'* | *ρvcfy,vc*/*fc'* | *ρhcfy,hc*/*fc'* | *P*/*fc'Ag* | Section shape | *Ab*/*Ag* |
| Lu et al. (2017) | C1 | F | 2.000 | 9.333 | 0.050 | 0.019 | 0.041 | 0.019 | 0.036 | R | 0.000 |
|  | C2 | F | 2.000 | 9.333 | 0.055 | 0.022 | 0.046 | 0.022 | 0.040 | R | 0.000 |
|  | C3 | F | 2.000 | 9.333 | 0.053 | 0.021 | 0.044 | 0.021 | 0.038 | R | 0.000 |
|  | C4 | F | 2.000 | 9.333 | 0.055 | 0.022 | 0.046 | 0.022 | 0.000 | R | 0.000 |
|  | C5 | F | 2.000 | 9.333 | 0.054 | 0.021 | 0.045 | 0.021 | 0.075 | R | 0.000 |
|  | C6 | F | 2.000 | 9.333 | 0.052 | 0.020 | 0.043 | 0.020 | 0.037 | R | 0.000 |
| Tripathi et al. (2019) | SWD-1 | F | 1.000 | 13.333 | 0.056 | 0.025 | 0.195 | 0.073 | 0.055 | R | 0.000 |
|  | SWD-2 | F | 1.000 | 13.333 | 0.053 | 0.024 | 0.186 | 0.053 | 0.055 | R | 0.000 |

**REFERENCES FOR SUPPLEMENTRAY MATERIAL**

Lefas ID, Kotsovos MD. Ambraseys NN. Behavior of reinforced concrete structural walls: Strength, deformation characteristics, and failure mechanism. *ACI Structural Journal* 1990a;87(1):23-31.

Lefas ID, Kotsovos MD. Strength and deformation characteristics of reinforced concrete walls under load reversals. *ACI Structural Journal* 1990b;87(6):716-726.

Pilakoutas K, Elnashai A. Cyclic behavior of reinforced concrete cantilever walls, Part I: Experimental results. *ACI Structural Journal* 1995;92(3):271-281.

Salonikios T, Kappos A, Tegos I, Penelis G. Cyclic load behavior of low-slenderness reinforced concrete walls: Design basis and test results. *ACI Structural Journal* 1999;96(4):649-660.

Park H-G, Baek J-W, Lee J-H, Shin H-M. Cyclic loading tests for shear strength of low-rise reinforced concrete walls with grade 550 MPa bars. *ACI Structural Journal* 2015;112(3):299-310.

Teng S, Chandra J. Cyclic shear behavior of high-strength concrete structural walls. *ACI Structural Journal* 2016;113(6):1335-1345.

Oesterle RG, Fiorato AE., Johal LS, Carpenter JE, Russell HG, Corley WG. Earthquake Resistant Structural Walls - Tests of Isolated Walls. Report to the National Science Foundation, Construction Technology Laboratories, Portland Cement Association, Skokie, Illinois; 1976.

Oesterle RG, Aristizabal JD, Fiorato AE, Russell HG, Corley WG. Earthquake Resistant Structural Walls - Tests of Isolated Walls - Phase II. Report to the National Science Foundation, Construction Technology Laboratories, Portland Cement Association, Skokie, Illinois; 1979.

Cheng M-Y, Hung S-C, Lequesne RD, Lepage A. Earthquake-resistant squat walls reinforced with high strength steel. *ACI Structural Journal* 2016;3(5):1065-1076.

Alarcon C, Hube MA, de la Llera JC. Effect of axial loads in the seismic behavior of reinforced concrete walls with unconfined wall boundaries. *Engineering Structures* 2014;73:13-23.

Tran TA. Experimental and analytical studies of moderate aspect ratio reinforced concrete structural walls. CA: Ph.D. thesis, University of California, Los Angeles; 2012.

Hube MA, Santa Maria H, Lopez M. Experimental campaign of thin reinforced concrete shear walls for low-rise constructions. 16th World Conference on Earthquake, Santiago, Chile, Paper No. 4387; 2017.

Liu X, Burgueno R, Egleston E, Hines EM. Inelastic Web Crushing Performance Limits of High-Strength-Concrete Structural Wall - Single Wall Test Program. Report No. CEE-RR–2009/03. East Lansing, MI: Michigan State University; 2009.

Ghorbani-Renani I, Velev N, Tremblay R, Palermo D, Massicotte B, Leger PL. Modeling and testing influence of scaling effects on inelastic response of shear walls. *ACI Structural Journal* 2009;106(3):358-367.

Hirosawa M. Past experimental results on reinforced concrete shear walls and analysis on them (in Japanese). Kenchiku Kenkyu Shiryo, No. 6. Tokyo, Japan: Building Research Institute, Ministry of Construction; 1975.

Dazio A, Beyer K, Bachmann H. Quasi-static cyclic tests and plastic hinge analysis of RC structural walls. *Engineering Structures* 2009;31(7):1556-1571.

Villalobos E. Response of reinforced concrete structural walls with discontinuities in their geometry and reinforcement configuration. IN: Ph.D. Thesis, Department of Civil Engineering, Purdue University; 2014.

Zhang Y, Wang Z. Seismic behavior of reinforced concrete shear walls subjected to high axial loading. *ACI Structural Journal* 2000;97(5):739-750.

Hube MA, Marihuen A, de la Llera JC, Stojadinovic B. Seismic behavior of slender reinforced concrete walls. *Engineering Structures* 2014;80:377-388.

Hidalgo PA, Ledezma CA, Jordan RM. Seismic behavior of squat reinforced concrete shear walls. *Earthquake Spectra* 2002;18(2):287-308.

Han SW, Oh Y-H, Lee L-H. Seismic behaviour of structural walls with specific details. *Magazine of Concrete Research* 2002;54(5):332-345.

Barda F, Hanson J, Corley WG. Shear strength of low-rise walls with boundary elements. *ACI Special Publication* 1977;149-202.

SLDRCE. SLDRCE Database on static tests of structural members and joint assemblies. State Key Laboratory of Disaster Reduction in Civil Engineering, Tongji University, Shanghai, China, 69-86; 2008

Greifenhagen C, Lestuzzi P. Static cyclic tests on lightly reinforced concrete shear walls. *Engineering Structures* 2005;27(11):1703-1712.

Tasnimi AA. Strength and deformation of mid-rise shear walls under load reversal. *Engineering Structures* 2000;22(4):311-322.

Aoyama H, Kato D, Katsumata H, Hosokawa Y. Strength and behavior of postcast shear walls for strengthening of existing reinforced concrete buildings. 8th World Conference on Earthquake Engineering, San Francisco, CA, 485-492; 1984.

Chiou YJ, Mo YL, Hsiao YW, Liou YW, Sheu MS. Behavior of high seismic performance walls. 13th World Conference on Earthquake Engineering, Vancouver, B.C., Canada, Paper No. 3180; 2004.

Cho SH, Tupper B, Cook WD, Mitchell D. Structural steel boundary elements for ductile concrete walls. *Journal of Structural Engineering* 2004;130(5):762-768.

Deng M, Liang X, Yang K. Experimental study on seismic behavior of high performance concrete shear wall with new strategy of transverse confining stirrups. The 14th World Conference on Earthquake Engineering, Beijing, China; 2008.

Elnashai AS, Pinho R. Repair and retrofitting of RC walls using selective techniques. *Journal of Earthquake Engineering* 1998; 2(4): 525-568.

Hsiao F-P, Wang J-C, Chiou Y-J. Shear strengthening of reinforced concrete framed shear walls using CFRP strips. The 14th World Conference on Earthquake Engineering, Beijing, China; 2008.

Hwang S-J, Tu Y-S, Yeh Y-H, Chiou T-C. Reinforced concrete partition walls retrofitted with carbon fiber reinforced polymer. ANCER Annual Meeting: Networking of Young Earthquake Engineering Researchers and Professionals; 2004.

Kabeyasawa T, Matsumoto K. Tests and analyses of ultra-high strength reinforced concrete shear walls. Tenth World Conference on Earthquake Engineering, Balkema, Rotterdam; 1992.

Kimura H, Sugano S. Seismic behavior of high strength concrete slender wall under high axial load. Eleventh World Conference on Earthquake Engineering, Paper No. 653, Acapulco, Mexico; 1996.

Lombard J, Lau DT, Humar JL, Foo S, Cheung MS. Seismic strengthening and repair of reinforced concrete shear walls. 12th World Conference on Earthquake Engineering, Auckland, New Zealand; 2000.

Lopes MS. Experimental shear-dominated response of RC walls: Part I: objectives, methodology and results. *Engineering Structures* 2001;23(3):229-239.

Massone LM, Orakcal K, Wallace JW. Modeling of squat structural walls controlled by shear. *ACI Structural Journal* 2009;106(5):646-655.

Nakamura N, Tsunashima N, Nakano T, Tachibana E. Analytical study on energy consumption and damage to cylindrical and I-shaped reinforced concrete shear walls subjected to cyclic loading. *Engineering Structures* 2009;31(4):999-10009.

Oh Y-H, Han S-W, Choi Y-S. Evaluation and improvement of deformation capacities of shear walls using displacement-based seismic design. *International Journal of Concrete Structures and Materials* 2006;18(1E):55-61.

Oh Y-H, Han SW, Lee L-H. Effect of boundary element details on the seismic deformation capacity of structural walls. *Earthquake Engineering and Structural Dynamics* 2002;31(8):1583-1602.

Palermo D, Vecchio FJ. Behavior of three-dimensional reinforced concrete shear walls. *ACI Structural Journal* 2002;99(1):81-89.

Paulay T, Priestley MJN, Synge AJ. Ductility in earthquake resisting squat shearwalls. *ACI Journal* 1982;79(4):257-269.

Sittipunt C, Wood, S. Improving the cyclic response of slender structural walls by changing the orientation of the web reinforcement. 1st U.S.-Japan Workshop on Performance-Based Earthquake Engineering Methodology for Reinforced Concrete Building Structures, Maui, Hawaii, 323-332; 2004.

Taylor CP, Thomsen JH, Wallace JW, Experimental verification of displacement-based design procedures for slender RC structural walls. Eleventh World Conference on Earthquake Engineering, Paper No. 644, Acapulco, Mexico; 1996.

Tokunaga R, Nakachi T. Experimental study on edge confinement of reinforced concrete core walls. Fifteenth World Conference on Earthquake Engineering, Lisbon, Portugal; 2012.

Tomazevic M, Lutman M, Capuder F, Petkovic L. Seismic behavior of R.C. shear walls: an experimental study. Eleventh World Conference on Earthquake Engineering, Paper No. 381, Acapulco, Mexico; 1996.

Wallace JW, Elwood KJ, Massone LM. Investigation of the axial load capacity for lightly reinforced wall piers. *Journal of Structural Engineering* 2008;134(9):1548-1557.

Su RKL, Wong SM. Seismic behaviour of slender reinforced concrete shear walls under high axial load ratio. *Engineering Structures* 2007;29(8):1957-1965.

Dabbagh H. Strength and ductility of High-strength concrete shear walls under reversed cyclic loading. Sydney, Australia: Ph.D. thesis, School of Civil and Environmental Engineering, The University of New South Wales; 2005.

Gebreyohaness A, Charles Clifton C, John Butterworth J, Ingham J. Experimental assessment of inadequately detailed reinforced concrete wall components. *ACI Structural Journal* 2014;111(2):279-290.

Jiang H, Wang B, Lu X. Experimental study on damage behavior of reinforced concrete shear walls subjected to cyclic loads. *Journal of Earthquake Engineering* 2013;17(7):958-971.

Kuang JS, Ho YB. Seismic behavior and ductility of squat reinforced concrete shear walls with nonseismic detailing. *ACI Structural Journal* 2008;105(2):225-231.

Gupta A, Rangan BV. High-strength concrete structural walls. *ACI Structural Journal* 1998;95(2):194-203.

Yuan W, Zhao J, Sun Y, Zeng L. Experimental study on seismic behavior of concrete walls reinforced by PC strands. *Engineering Structures* 2018;175(15);577-590.

Yanez FV, Park R, Paulay T. Seismic behaviour of reinforced concrete structural walls with regular and irregular openings. Proceedings of Pacific Conference on Earthquake Engineering, New Zealand, 67-78; 1991.

Terzioglu T, Orakcal K, Massone LM. Cyclic lateral load behavior of squat reinforced concrete walls. *Engineering Structures* 2018;160:147-160.

Abdulridha A, Palermo D. Behaviour and modelling of hybrid SMA-steel reinforced concrete slender shear wall. *Engineering Structures* 2017;147:77-89.

Christidis KI, Trezos KG. Experimental investigation of existing non-conforming RC shear walls. *Engineering Structures* 2017;140:26-38.

Ren F, Chen J, Chen G, Guo Y, Jiang T. Seismic behavior of composite shear walls incorporating concrete-filled steel and FRP tubes as boundary elements. *Engineering Structures* 2018;168:405-419.

Qiao Q, Cao W, Qian Z, Li X, Zhang W, Liu W. Cyclic behavior of low rise concrete shear walls containing recycled coarse and fine aggregates. *Materials* 2017;10:1400.

Shen D, Yang Q, Jiao Y, Cui Z, Zhang J. Experimental investigations on reinforced concrete shear walls strengthened with basalt fiber-reinforced polymers under cyclic load. *Construction and Building Materials* 2017;136:217-229.

Mohamed N, Farghaly AS, Benmokrane B, Neale KW. Numerical simulation of mid-rise concrete shear walls reinforced with GFRP bars subjected to lateral displacement reversals. *Engineering Structures* 2014;73:62-71.

Ghazizadeh S, Cruz-Noguez CA. Damage-resistant reinforced concrete low-rise walls with hybrid GFRP-steel reinforcement and steel fibers. *Journal of Composites for Construction* 2018;22(2):04018002.

Aanasopoulou A. Shear strength and drift capacity of reinforced concrete and high-performance fiber reinforced concrete low-rise walls subjected to displacement reversals. MI: Ph.D. thesis, Civil Engineering, University of Michigan, Ann Arbor; 2010.

Alltin S. Anil O, Kopraman Y, Kara ME. Hysteretic behavior of RC shear walls strengthened with CFRP strips. *Composites Part B: Engineering* 2013;44:321-329.

Zhu Z, Guo Z. Experimental study on emulative hybrid precast concrete shear walls. *KSCE Journal of Civil Engineering* 2017;21(1):329-338.

Mansur MA, Balendra T, H’ng SC. Tests on Reinforced Concrete Low-Rise Shear Walls under Cyclic Loading. In Concrete Shear in Earthquake, Boca Raton, FL: CRC Press, 14-16; 1992.

Lu Y, Henry RS, Cultom R, Ma QT. Cyclic testing of reinforced concrete walls with distributed minimum vertical reinforcement. *Journal of Structural Engineering* 2017;143(5):04016225.

Tripathi M, Dhakal RP, Dashti F. Bar buckling in ductile RC walls with different boundary zone detailing: Experimental investigation. *Engineering Structures* 2019;198:109544.