# APPENDIX I

## The optimal weight for SDOF Extened-Bouc-Wen-Barber-Noori hysteretic system ($\alpha = 0.1$) with unknown damping

Table I The optimal weight for SDOF Extened-Bouc-Wen-Barber-Noori hysteretic system ($\alpha = 0.1$) with unknown damping

| $u_{ih}$ | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | 0.0462918622 | 1.2381509967 | 0.8658136794 | 0.2488243534 | -0.5794619999 | -0.5498132020 |
| 2 | -0.9785345858 | 0.3013757102 | -0.4493874188 | -0.4721786709 | 1.1781446254 | 0.4939331203 |
| 3 | 0.5068082421 | 0.5234409560 | -0.2344795726 | 0.6072237716 | 0.0685288048 | 0.0146114688 |
| 4 | 0.0593086340 | 0.7959348596 | 0.5800794622 | -0.2188757214 | -0.7649168683 | -0.1184164702 |
| 5 | -0.3262074038 | 0.4390722094 | 0.2126032215 | 1.1158259608 | 0.2480683555 | 0.1467117673 |
| 6 | 0.1623338484 | 0.0790570095 | 0.4752111860 | -0.2782251079 | -0.7599884665 | 0.6061241226 |
| 7 | 0.5961808304 | -0.1936762004 | 0.6558267443 | 0.5179402544 | -0.3595902684 | -0.2621337556 |
| 8 | -0.3574934973 | 0.4353311787 | 0.6470283763 | 0.3934847626 | -0.2793974081 | 0.1126141185 |
| 9 | -0.0000724195 | -0.8473087286 | 0.4481231282 | -0.6714612029 | 0.2038399670 | 0.0332748893 |
| 10 | -0.4850396406 | 0.6339529377 | 0.5484754382 | -0.9818066838 | 0.1206873124 | 0.3425896046 |
| 11 | 0.1629772015 | 1.0589465223 | 0.8467849722 | 0.2260469984 | 0.2668297758 | 0.0136566789 |
| 12 | -0.6570942961 | -0.5786050921 | -0.8874624645 | -0.8440732415 | -0.4111574862 | 0.8471199450 |
| 13 | -0.0839318283 | 0.7642589977 | 0.3433883013 | 0.6585898516 | 0.0121745979 | -0.0458528484 |

| $u_{ih}$ | 7 | 8 | 9 |
|---|---|---|---|
| 1 | -0.0396107847 | -0.3067378602 | -0.5085286909 |
| 2 | 0.0699492047 | 0.4782250982 | 0.6882067823 |
| 3 | 0.5930006293 | 0.4579113530 | 0.4100928504 |
| 4 | 0.2834965303 | 0.0315685822 | -0.3149454422 |
| 5 | 0.6658387969 | 0.2939622656 | -0.0944694468 |
| 6 | -0.5703500463 | -0.3407706001 | -0.0751476625 |
| 7 | 0.1354181176 | 0.3848721927 | -0.3282388517 |
| 8 | 0.0633214632 | -0.9164746789 | -0.1957106897 |
| 9 | -0.3808103892 | -0.2564809786 | 0.5653379407 |
| 10 | 0.8253474238 | 0.7618263349 | 1.7656925390 |
| 11 | 0.2629577604 | -1.4826492228 | -0.2785647337 |
| 12 | 0.4439146882 | 0.5859417098 | 0.5441556644 |
| 13 | 0.3703421823 | 0.3294310319 | -0.2759357140 |

Table I (Continued)

| $v_{hj}$ | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1 | -0.5585905685 | 0.3874451242 | 0.7547924986 | 0.0345407280 | 0.7991125104 | 0.3861276656 |
| 2 | -0.1055704445 | 0.2590445772 | -0.3849885623 | 0.7052865564 | 0.5269239835 | 1.1170002011 |
| 3 | 0.6953179381 | -0.8660504820 | -0.4822919282 | -0.2942276260 | -0.8673572983 | -0.7952843303 |
| 4 | -0.2984042732 | -0.0001990842 | -0.2459981016 | -1.1452722018 | -0.0889618067 | -0.6597928233 |
| 5 | 0.0595994920 | -0.0049205871 | 0.6544898315 | 0.2318240574 | -0.4035729288 | 0.3863451001 |
| 6 | -0.5606392650 | 0.6685980212 | -0.4339172154 | -0.4899636960 | -0.5313051401 | -0.2560868613 |
| 7 | -0.1850005210 | 0.6554469344 | -0.6254084668 | 0.0367828358 | -0.6631055706 | -0.7237406806 |
| 8 | -0.3786420919 | -0.4557920720 | 0.1136524679 | -0.4094316547 | 0.1539119327 | 0.2299204442 |
| 9 | -0.4667820407 | -0.7980812576 | -0.1203881253 | 0.2778743924 | -0.1390025970 | 0.7669325514 |
| 10 | -0.5335758664 | -0.0772341697 | 0.5303541604 | 0.5076677527 | 0.0236731094 | 0.4154076399 |
| 11 | 0.4122023899 | -0.1409670003 | -0.2150489951 | -0.0762853878 | -0.2635644916 | 1.0055276026 |
| 12 | -0.0859867438 | -0.3810524733 | 0.1742624777 | -1.0181851409 | -0.5059086939 | 0.2656401802 |
| 13 | -0.1989868912 | 0.2165203073 | -0.3569348823 | 0.0091190257 | 0.2258152269 | 0.8680956329 |

| $v_{hj}$ | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|
| 1 | -0.1879091767 | -0.1144596741 | -0.1509849960 | 1.1116934971 | -0.3679151548 | -0.3334241752 |
| 2 | -0.6175253425 | 0.6296464526 | 0.7680534757 | 0.1589215025 | -0.1340306231 | -0.6534965048 |
| 3 | -0.1201538625 | -0.3513985011 | -0.0937832509 | 0.1221843217 | -1.1450594021 | 0.5743380876 |
| 4 | 0.7143488765 | -1.4150396492 | 1.1484126683 | 0.7951972220 | 0.8207951437 | 0.1048425252 |
| 5 | -0.5273300932 | -0.5864949522 | -0.5631161925 | 0.0369891944 | 0.0240049569 | -0.5089673243 |
| 6 | 0.3411320487 | 0.5126607184 | -0.0044036347 | -0.5150905486 | 0.0581148448 | -0.0266811482 |
| 7 | -0.3549291616 | -0.0486763788 | -0.5637384496 | 0.1786961992 | 0.1678403477 | -0.3189347724 |
| 8 | 0.2907364794 | 0.0398975104 | 0.5375103313 | 0.0949388147 | 0.2646986928 | 0.4804778571 |
| 9 | -0.4747053967 | 0.5418960811 | -0.0037442318 | -0.0880210228 | 0.1671343951 | -0.0238632976 |
| 10 | -0.0122285437 | -0.9825910611 | 0.0402167473 | 0.5262679668 | -0.5014250398 | -1.0679101772 |
| 11 | -1.0861399656 | -0.3578178850 | 0.1830610378 | 0.9078333292 | -0.8470439260 | -0.6245110116 |
| 12 | -0.5218471135 | -0.5318678798 | -0.4090053724 | -0.2998786154 | -0.9559117837 | -0.0458260995 |
| 13 | 0.3006287087 | -0.4685458864 | 0.5198630272 | 0.0931316531 | 0.0905601993 | -0.5929875687 |

Table I (Continued)

| $v_{hj}$ | 13 | 14 |
|---|---|---|
| 1 | -0.1731120205 | 0.2767033160 |
| 2 | -0.5723088529 | 0.6861981325 |
| 3 | -0.3196556841 | -0.4420329007 |
| 4 | 0.1161197178 | -0.0395684839 |
| 5 | -0.1650182711 | -0.1806313220 |
| 6 | 0.1424266737 | -0.3579991760 |
| 7 | -0.1152240327 | 1.0079141420 |
| 8 | 0.7264932317 | -0.1168992743 |
| 9 | 0.0018057487 | -0.6995268043 |
| 10 | -0.6855029032 | 0.8966994257 |
| 11 | -0.0278272804 | 0.1609989914 |
| 12 | 0.0026319487 | -0.7183281523 |
| 13 | 0.1692594978 | 0.2775457916 |

| $w_j$ | |
|---|---|
| 1 | -0.11269303 |
| 2 | 0.361423905 |
| 3 | 0.633731113 |
| 4 | -0.68230557 |
| 5 | -1.78536234 |
| 6 | 1.574762045 |
| 7 | -0.07846752 |
| 8 | 0.605796605 |
| 9 | -1.07362619 |
| 10 | -0.04780135 |
| 11 | 1.059687872 |
| 12 | 0.32666979 |
| 13 | 0.768865842 |
| 14 | 0.021763021 |