**Supplementary File 2.** Sensitivity analyses for Kalman filter parameters and minimum step resolution values.

(A)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Kalman filter analysis µ values | | | | | | |
|  |  | Position & velocity | | | Covariance | | |  |
| Treatment | mu | 1 | 0.1 | 0.05 | 2 | 0.5 | 0.1 | Average |
| BL/+ 33 Deg | 1.45 | 1.48 | 1.38 | 1.42 | 1.40 | 1.48 | 1.45 | 1.44 |
| BLsens-shi | 2.29 | 2.28 | 2.30 | 2.28 | 2.30 | 2.28 | 2.19 | 2.27 |
| BL-shi | 2.13 | 2.09 | 2.07 | 2.08 | 2.12 | 2.08 | 2.13 | 2.10 |
| BL/+ 22 Deg | 1.62 | 1.77 | 1.61 | 1.61 | 1.64 | 1.77 | 1.79 | 1.70 |
| MB247/+ | 2.22 | 2.38 | 2.20 | 2.10 | 2.20 | 2.38 | 2.27 | 2.26 |
| MB247-shi | 1.17 | 1.24 | 1.16 | 1.15 | 1.16 | 1.24 | 1.31 | 1.21 |
| BLsens-rprhid | 1.98 | 1.99 | 2.03 | 2.05 | 1.98 | 2.00 | 2.01 | 2.01 |
| BLsens-rprhid\_control | 1.55 | 1.48 | 1.48 | 1.43 | 1.50 | 1.57 | 1.58 | 1.51 |
| shi/+ 22 Deg | 1.31 | 1.43 | 1.21 | 1.24 | 1.27 | 1.43 | 1.40 | 1.33 |
| shi/+ 33 Deg | 1.35 | 1.36 | 1.56 | 1.16 | 1.71 | 1.36 | 2.31 | 1.58 |

(B)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Minimum step analysis µ values | | | | | |
|  |  | Minimum step resolution (mm) | | | |  |  |
| Treatment | mu | 0.3 | 0.5 | 0.7 | 0.9 | Average | Overall average |
| BL/+ 33 Deg | 1.45 | 1.46 | 1.46 | 1.44 | 1.42 | 1.45 | 1.44 |
| BLsens-shi | 2.29 | 2.25 | 2.26 | 2.14 | 3.90 | 2.64 | 2.42 |
| BL-shi | 2.13 | 2.13 | 2.13 | 2.13 | 2.13 | 2.13 | 2.11 |
| BL/+ 22 Deg | 1.62 | 1.67 | 1.64 | 1.60 | 1.59 | 1.63 | 1.67 |
| MB247/+ | 2.22 | 2.12 | 2.24 | 2.29 | 2.02 | 2.17 | 2.22 |
| MB247-shi | 1.17 | 1.20 | 1.16 | 1.16 | 1.22 | 1.19 | 1.20 |
| BLsens-rprhid | 1.98 | 1.98 | 2.01 | 1.99 | 1.95 | 1.98 | 2.00 |
| BLsens-rprhid\_control | 1.55 | 1.58 | 1.51 | 1.48 | 1.67 | 1.56 | 1.53 |
| shi/+ 22 Deg | 1.31 | 1.40 | 1.21 | 1.20 | 1.23 | 1.26 | 1.30 |
| shi/+ 33 Deg | 1.35 | 1.29 | 1.25 | 1.25 | 1.60 | 1.35 | 1.49 |