# Table S2. Summary of available constraint terms for Tracking, Verification, and Design Optimization.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Constraint Term* | *Component Type* | *Tracking Optimization* | *Verification Optimization* | *Design Optimization* |
| generalized\_coordinate\_deviation | coordinate | ü | ü | ü |
| generalized\_coordinate\_value | coordinate | ü | ü | ü |
| generalized\_coordinate\_periodicity | coordinate | ü | ü | ü |
| initial\_generalized\_coordinate\_deviation | coordinate | ü | ü | ü |
| initial\_generalized\_coordinate\_value | coordinate | ü | ü | ü |
| final\_generalized\_coordinate\_deviation | coordinate | ü | ü | ü |
| final\_generalized\_coordinate\_value | coordinate | ü | ü | ü |
| generalized\_speed\_deviation | coordinate | ü | ü | ü |
| generalized\_speed\_value | coordinate | ü | ü | ü |
| generalized\_speed\_periodicity | coordinate | ü | ü | ü |
| initial\_generalized\_speed\_deviation | coordinate | ü | ü | ü |
| initial\_generalized\_speed\_value | coordinate | ü | ü | ü |
| final\_generalized\_speed\_deviation | coordinate | ü | ü | ü |
| final\_generalized\_speed\_value | coordinate | ü | ü | ü |
| generalized\_acceleration\_deviation | coordinate | ü | ü | ü |
| generalized\_acceleration\_value | coordinate | ü | ü | ü |
| marker\_position\_deviation | marker | ü | ü | ü |
| marker\_position\_value | marker | ü | ü | ü |
| marker\_position\_periodicity | marker | ü | ü | ü |
| initial\_marker\_position\_deviation | marker | ü | ü | ü |
| initial\_marker\_position\_value | marker | ü | ü | ü |
| final\_marker\_position\_deviation | marker | ü | ü | ü |
| final\_marker\_position\_value | marker | ü | ü | ü |
| marker\_velocity\_deviation | marker | ü | ü | ü |
| marker\_velocity\_value | marker | ü | ü | ü |
| marker\_velocity\_periodicity | marker | ü | ü | ü |
| initial\_marker\_velocity\_deviation | marker | ü | ü | ü |
| initial\_marker\_velocity\_value | marker | ü | ü | ü |
| final\_marker\_velocity\_deviation | marker | ü | ü | ü |
| final\_marker\_velocity\_value | marker | ü | ü | ü |
| body\_orientation\_deviation | body | ü | ü | ü |
| body\_orientation\_value | body | ü | ü | ü |
| body\_orientation\_periodicity | body | ü | ü | ü |
| initial\_body\_orientation\_deviation | body | ü | ü | ü |
| initial\_body\_orientation\_value | body | ü | ü | ü |
| final\_body\_orientation\_deviation | body | ü | ü | ü |
| final\_body\_orientation\_value | body | ü | ü | ü |
| kinetic\_consistency | load | ü | ü | ü |
| root\_segment\_residual\_load | load | ü | ü | ü |
| root\_segment\_residual\_load\_periodicity | load | ü | ü | ü |
| external\_force\_deviation | force | ü | ü | ü |
| external\_force\_value | force | ü | ü | ü |
| external\_force\_periodicity | force | ü | ü | ü |
| initial\_external\_force\_deviation | force | ü | ü | ü |
| initial\_external\_force\_value | force | ü | ü | ü |
| final\_external\_force\_deviation | force | ü | ü | ü |
| final\_external\_force\_value | force | ü | ü | ü |
| external\_moment\_deviation | moment | ü | ü | ü |
| external\_moment\_value | moment | ü | ü | ü |
| external\_moment\_periodicity | moment | ü | ü | ü |
| initial\_external\_moment\_deviation | moment | ü | ü | ü |
| initial\_external\_moment\_value | moment | ü | ü | ü |
| final\_external\_moment\_deviation | moment | ü | ü | ü |
| final\_external\_moment\_value | moment | ü | ü | ü |
| center\_of\_pressure\_deviation | hindfoot\_body | ü |  | ü |
| center\_of\_pressure\_value | hindfoot\_body | ü |  | ü |
| muscle\_activation\_deviation | muscle | ü | ü | ü |
| muscle\_activation\_value | muscle | ü | ü | ü |
| controller\_deviation | controller | ü | ü | ü |
| controller\_value | controller | ü | ü | ü |
| synergy\_vector\_sum | synergy | ü |  | ü |
| synergy\_vector\_magnitude | synergy | ü |  | ü |
| limit\_normalized\_fiber\_length | muscle |  |  | ü |
| user\_defined | any |  |  | ü |