# Table S1. Summary of available cost function terms for Tracking, Verification, and Design Optimization.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Cost Term* | *Component Type* | *Tracking Optimization* | *Verification Optimization* | *Design Optimization* |
| generalized\_coordinate\_tracking | coordinate | ü | ü | ü |
| generalized\_speed\_tracking | coordinate | ü | ü | ü |
| generalized\_speed\_minimization | coordinate | ü | ü | ü |
| generalized\_acceleration\_tracking | coordinate | ü | ü | ü |
| generalized\_acceleration\_minimization | coordinate | ü | ü | ü |
| marker\_position\_tracking | marker | ü | ü | ü |
| marker\_velocity\_tracking | marker | ü | ü | ü |
| body\_orientation\_tracking | body | ü | ü | ü |
| body\_orientation\_minimization | body | ü |  | ü |
| inverse\_dynamics\_load\_tracking | load | ü |  | ü |
| inverse\_dynamics\_load\_minimization | load | ü |  | ü |
| inverse\_dynamics\_slope\_tracking | load | ü |  | ü |
| external\_force\_tracking | force | ü |  | ü |
| external\_moment\_tracking | moment | ü |  | ü |
| center\_of\_presssure\_tracking | hindfoot\_body | ü |  | ü |
| muscle\_activation\_tracking | muscle | ü |  | ü |
| muscle\_activation\_minimization | muscle | ü |  | ü |
| synergy\_vector\_tracking | synergy | ü |  | ü |
| synergy\_vector\_symmetry | synergies | ü |  | ü |
| controller\_tracking | controller | ü | ü | ü |
| controller\_minimization | controller | ü |  | ü |
| controller\_slope\_minimization | controller | ü |  | ü |
| controller\_shape\_tracking | controller |  |  | ü |
| joint\_energy\_generation\_goal | coordinate |  |  | ü |
| joint\_energy\_absorption\_goal | coordinate |  |  | ü |
| inverse\_dynamics\_shape\_tracking | load |  |  | ü |
| angular\_momentum\_minimization | none |  |  | ü |
| relative\_walking\_speed\_goal | none |  |  | ü |
| absolute\_metabolic\_cost\_per\_time | none |  |  | ü |
| absolute\_metabolic\_cost\_per\_distance | none |  |  | ü |
| relative\_metabolic\_cost\_per\_time | none |  |  | ü |
| relative\_metabolic\_cost\_per\_distance | none |  |  | ü |
| propulsive\_impulse\_goal | hindfoot\_body |  |  | ü |
| braking\_impulse\_goal | hindfoot\_body |  |  | ü |
| user\_defined | any |  |  | ü |