| Var | Name | Defn | Desc |
|---|---|---|---|
| q | q | $\boldsymbol{q}=[q_0,\ldots,q_7]$<br>$\boldsymbol{q}=[s_0,t_0,s_1,t_1,s_2,t_2,s_3,t_3]$ | Joint Coords,<br>Pairs of steer/trans coords.<br>At caster-steer and wheel-roll, NOT motors. |
| $s_i$ | $i^{th}$ steer joint | | Steer joint angle |
| $t_i$ | $i^{th}$ trans joint | | (only speeds, $\dot{t}_i$ , used) |
| tq | joint torques | $\boldsymbol{\tau}=[\tau_s,\tau_t]$ | Joint Torques on<br>caster-steer and wheel-roll joints |
| mtq | motor torques | $\boldsymbol{\tau}_{\mathbf{mot}}=\boldsymbol{N}^{-1}\boldsymbol{\tau}$ | |
| $\boldsymbol{N}$ | gearbox ratios | $\boldsymbol{\omega}_{\mathbf{mot}}=\boldsymbol{N}\,\dot{\boldsymbol{q}}$ | steer/trans mot speeds=N*steer/trans joint speeds |
| | | | |
| qd | q-dot | $\dot{\boldsymbol{q}}$ | Joint speeds |
| x | x | $\boldsymbol{x}=[x,y,\theta]$ | Local Coords |
| xd | x-dot | $\dot{\boldsymbol{x}}=[\dot{x},\dot{y},\dot{\theta}]$ | Local Velocity |
| rxd | raw x-dot | $\boldsymbol{x}=[x,y,\theta]$ | Raw Local Velocity {unfiltered} |
| rgxd | raw global x-dot | $\dot{\boldsymbol{x}}=[\dot{x},\dot{y},\dot{\theta}]$ | Raw Global Velocity {unfiltered} |
| gx | global x | $\boldsymbol{x}=[x,y,\theta]$ | Global Coords |
| gxd | global x-dot | $\dot{\boldsymbol{x}}=[\dot{x},\dot{y},\dot{\theta}]$ | Global Velocity |
| gxdd | global x-double-dot | $\ddot{\boldsymbol{x}}=[\ddot{x},\ddot{y},\ddot{\theta}]$ | Global Acceleration |
| dx | desired x | | Desired/Goal position |
| dxd | desired x-dot | | Desired/Goal velocity |
| dxdd | desired x-double-dot | | Desired/Goal acceleration |
| | | | |
| KPx_ | | 1200 1/s^2 | Controller position gain, Linear |
| KVx_ | | 4 1/s | Controller velocity gain, Linear |
| KPa_ | | 1100 m/s^2 | Controller position gain, Angular |
| KVa_ | | 2 m/s | Controller velocity gain, Angular |
| KpE_ | | 170 kg/s | Virtual Truss Controller position gain |
| | | | |
| J, Jt | Jacobian (transpose) | $\dot{\boldsymbol{x}}=\boldsymbol{J}\,\dot{\boldsymbol{q}}$ | |
| C | Constraint Matrix | $\dot{\boldsymbol{q}}=\boldsymbol{C}\,\dot{\boldsymbol{x}}$ | |
| Lambda | $\boldsymbol{\Lambda}$ | | Op-Space Mass matrix |
| Mu | $\boldsymbol{\mu}$ | | Op-space velocity coupling vector |
| | | | |
| cxdd | local control accel | $\ddot{\boldsymbol{x}}=\boldsymbol{K}_p(\boldsymbol{x}_{\mathbf{des}}-\boldsymbol{x})+\boldsymbol{K}_v(\dot{\boldsymbol{x}}_{\mathbf{des}}-\dot{\boldsymbol{x}})$ | Control acceleration, local coords |
| cgxdd | global control accel | | Control acceleration, global coords |
| cf | control force | $\boldsymbol{F}=\boldsymbol{\Lambda}\,\ddot{\boldsymbol{x}}+\boldsymbol{\mu}$<br>$\boldsymbol{F}=[F_x,F_y,M_\theta]$ | Control force of unit-mass system<br>(gravity term, p, not implemented) |