ATRIAS Coordinate Systems

Generalized Coordinate System 1

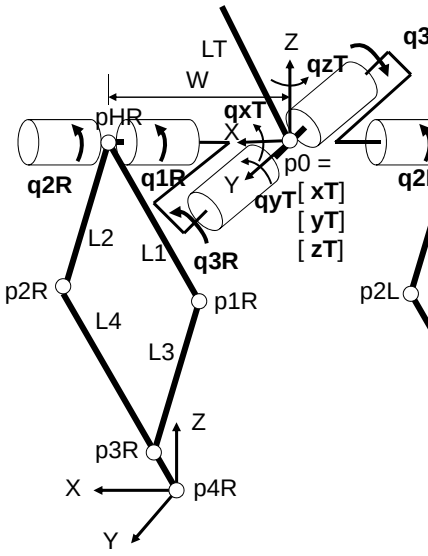
(a) 12 dof model:

- 3 torso positional variables: (xT, yT, zT)
- 3 torso rotational angles: (qzT, qyT, qxT)
- 6 actuated joints: (q1R, q2R, q3R) and (q1L, q2L, q3L)

(b) 9 dof SS model: (foot-end position is fixed)

- 3 torso rotational angles: (qzT, qyT, qxT)
- 6 actuated joints: (q1R, q2R, q3R) and (q1L, q2L, q3L)

Generalized Coordinate System 1



Rotational matrices

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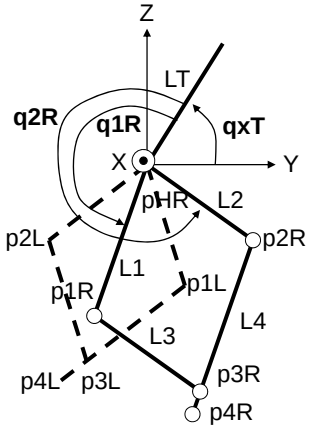
R0 = Rz(qzT)*Ry(qyT)*Rx(qxT);
R3 = R0*Ry(q3R);
R1 = R3*Rx(q1R);
R2 = R3*Rx(q2R);
R4 = R0*Ry(-q3L);
R5 = R4*Rx(q1L);
R6 = R4*Rx(q2L);
```

Generalized Coordinate System 1 in y-z plane (sagittal plane)



Generalized Coordinate System 2

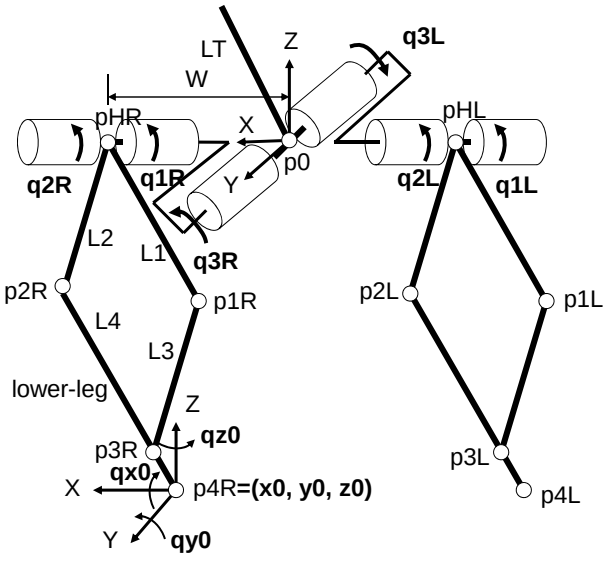
(a) 12 dof model:

- 3 foot-end positional variables: (x0, y0, z0)
- 3 lower-leg rotational angles: (qz0, qy0, qx0)
- 6 actuated joints: (q1R, q2R, q3R) and (q1L, q2L, q3L)

(b) 9 dof SS model: (foot-end position is fixed)

- 3 lower-leg rotational angles: (qz0, qy0, qx0)
- 6 actuated joints: (q1R, q2R, q3R) and (q1L, q2L, q3L)

Generalized Coordinate System 2



Generalized Coordinate System 2 in y-z plane (sagittal plane)