

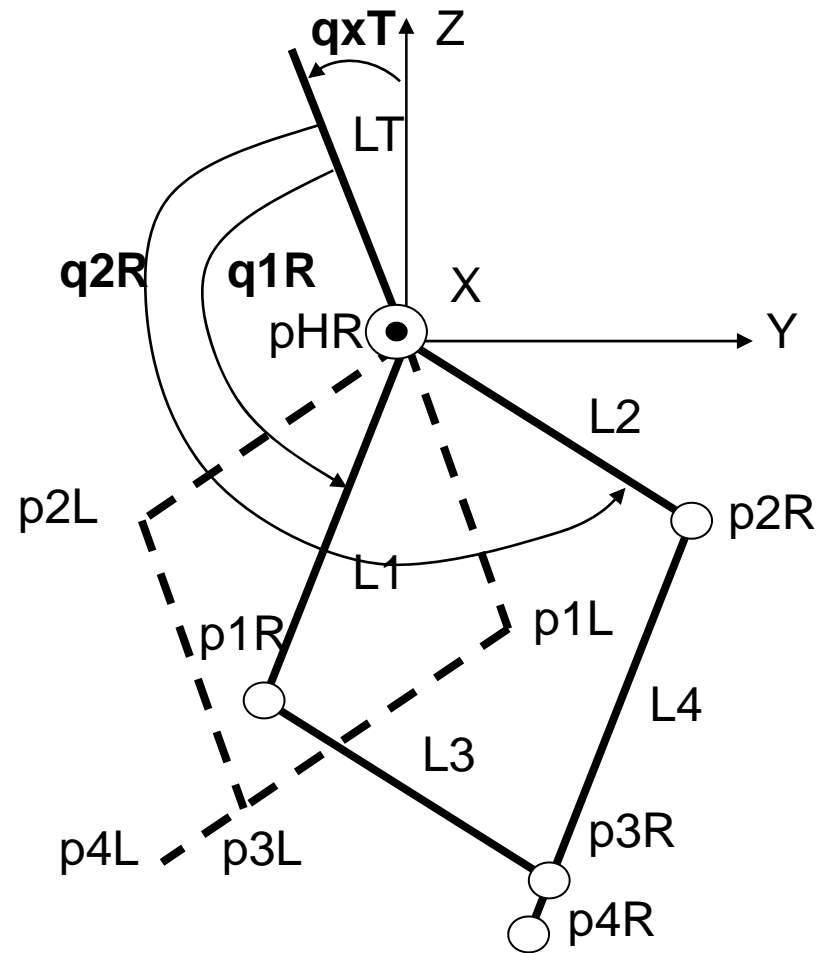
# ATRIAS

## Parameters for Planar Model

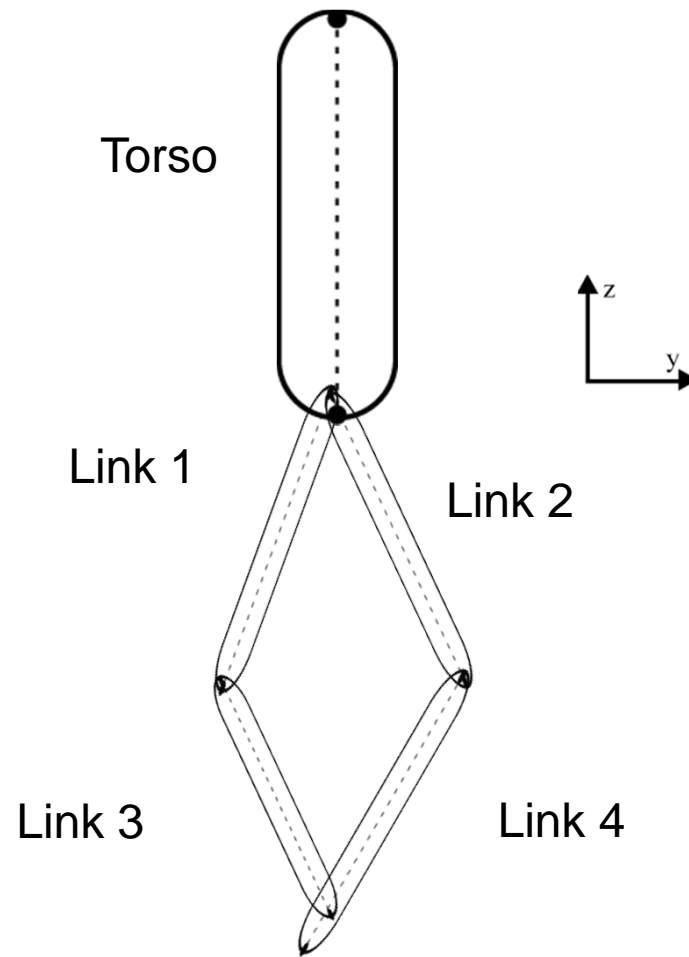
21 April 2011

J. Grizzle

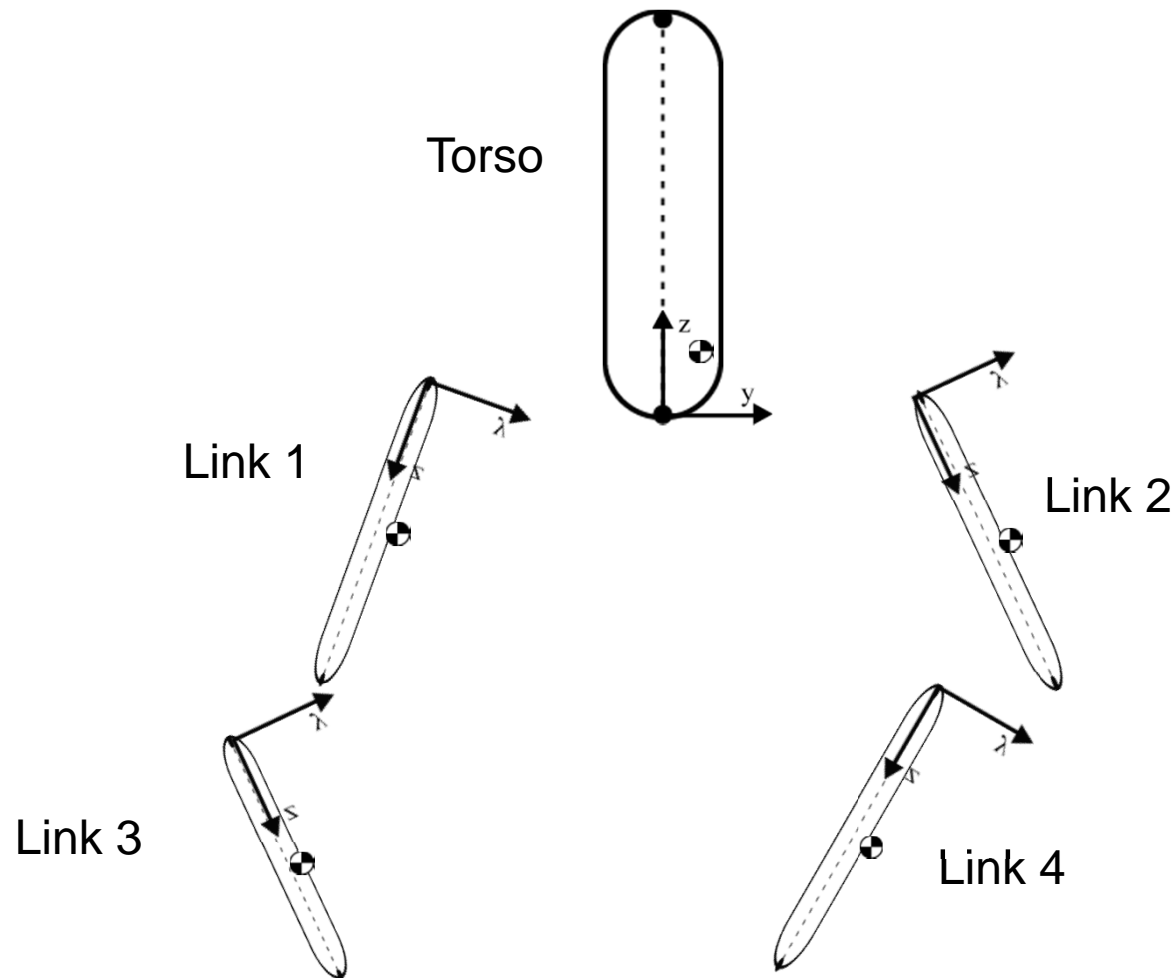
# ATRIAS Coordinate System in y-z (sagittal) plane)



# Parameters for Torso and One Leg



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Link Name	Length (m)	Mass (kg)	Inertia about CoM (kg m <sup>2</sup> )	Y-CoM (m)	Z-Com (m)
Torso		44.0	1.37	0.0	0.01
1	0.45	0.66149	0.01910	0.04566	0.16957
2	0.5	0.68292	0.02116	-0.02624	0.18626
3	0.5	0.19126	0.00633	0.0	0.24997
4	0.5	0.42493	0.01243	0.0	0.23832

**Nominal Model**

# Parameters for Torso and One Leg

Mass of motors and gearing is included in the torso mass and inertia calculation

Rotor inertia of motor (same for each motor):  $J=2.86e-3 \text{ kg m}^2$

Gear inertia\* (same for each gear):  $J= 2.5e-3; \% \text{ kg m}^2$

**\*Remark:** SHOULD be the Harmonic Drive Inertia, but currently, it is the nominal value from MABEL step down pulley

Gear ratios:  $R=20:1$  and  $R=50:1$

# Parameters for Torso and One Leg

Springs are modeled as linear elements between gearing and links 1 and 2 of the 4-bar linkage

Stiffness:  $K = 1200 \text{ N-m/rad.}$  (from Jonathan)

**Damping:**  $\text{Zeta} = 0.5;$   $K_d = 2 * \text{Zeta} * \text{sqrt}(K)$  (made up by Jessy)

# Torso Modification

- The battery pack has mass 7 kg and is mounted 9 cm below the hip location
- Moving it to 9 cm ABOVE the hip changes the torso CoM to  $0.0374 \text{ m} = 3.74 \text{ cm}$  above the hip.
- There is a small change to the inertia, but I have neglected it.