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Corrections to:

Reaction Mass Pendulum (RMP): An explicit model for centroidal angular momentum of humanoid robots

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A. Equimomental ellipsoids

Refers to Section II C (*Equimomental ellipsoids*)of the paper.

Let $(\sigma_1, \sigma_2, \sigma_3)$ denote the eigenvalues of the rotational inertia, and (a_1, a_2, a_3) denote the semi-axes of the equimomental ellipsoid. From the relationships

$$\sigma_1 = \frac{m}{5}(a_2^2 + a_3^2) \tag{1}$$
$$\sigma_2 = \frac{m}{5}(a_1^2 + a_3^2) \tag{2}$$
$$\sigma_3 = \frac{m}{5}(a_1^2 + a_2^2) \tag{3}$$

and $m = \frac{4}{3}\pi a_1 a_2 a_3 \rho$, where ρ is the mean density, we can derive the following:

$$a_1 = \left(\frac{15}{8\pi\rho}\right)^{\frac{1}{5}} \frac{(-\sigma_1 + \sigma_2 + \sigma_3)^{\frac{2}{5}}}{[(\sigma_1 - \sigma_2 + \sigma_3)(\sigma_1 + \sigma_2 - \sigma_3)]^{\frac{1}{10}}} \tag{4}$$
$$a_2 = \left(\frac{15}{8\pi\rho}\right)^{\frac{1}{5}} \frac{(\sigma_1 - \sigma_2 + \sigma_3)^{\frac{2}{5}}}{[(-\sigma_1 + \sigma_2 + \sigma_3)(\sigma_1 + \sigma_2 - \sigma_3)]^{\frac{1}{10}}} \tag{5}$$
$$a_3 = \left(\frac{15}{8\pi\rho}\right)^{\frac{1}{5}} \frac{(\sigma_1 + \sigma_2 - \sigma_3)^{\frac{2}{5}}}{[(-\sigma_1 + \sigma_2 + \sigma_3)(\sigma_1 - \sigma_2 + \sigma_3)]^{\frac{1}{10}}} \tag{6}$$

B. CRB Inertia Jacobian Equations

Refers to Eqs. 20, 21 of Section IV B (*CRB Inertia Jacobian of Humanoid*) of the paper.

In the following equations

$$\delta\widehat{\bar{\boldsymbol{I}}} = \boldsymbol{J}_{\bar{\boldsymbol{I}}0}(\boldsymbol{T}_0\delta\boldsymbol{T}_0^{-1}) + [\boldsymbol{J}_{\bar{\boldsymbol{I}}r}\ \boldsymbol{J}_{\bar{\boldsymbol{I}}l}\ \boldsymbol{J}_{\bar{\boldsymbol{I}}t}]\delta\boldsymbol{q} \tag{7}$$
$$m\delta\boldsymbol{r}_G = \boldsymbol{J}_{G0}(\boldsymbol{T}_0\delta\boldsymbol{T}_0^{-1}) + [\boldsymbol{J}_{Gr}\ \boldsymbol{J}_{Gl}\ \boldsymbol{J}_{Gt}]\delta\boldsymbol{q} \tag{8}$$

replace $(\boldsymbol{T}_0\delta\boldsymbol{T}_0^{-1})$ with $(\boldsymbol{T}_0^{-1}\delta\boldsymbol{T}_0)$. The corrected equations should be:

$$\delta\widehat{\bar{\boldsymbol{I}}} = \boldsymbol{J}_{\bar{\boldsymbol{I}}0}(\boldsymbol{T}_0^{-1}\delta\boldsymbol{T}_0) + [\boldsymbol{J}_{\bar{\boldsymbol{I}}r}\ \boldsymbol{J}_{\bar{\boldsymbol{I}}l}\ \boldsymbol{J}_{\bar{\boldsymbol{I}}t}]\delta\boldsymbol{q} \tag{9}$$
$$m\delta\boldsymbol{r}_G = \boldsymbol{J}_{G0}(\boldsymbol{T}_0^{-1}\delta\boldsymbol{T}_0) + [\boldsymbol{J}_{Gr}\ \boldsymbol{J}_{Gl}\ \boldsymbol{J}_{Gt}]\delta\boldsymbol{q} \tag{10}$$