$$\begin{cases} x_1^C = l_1 \cos q_1 + l_2 \cos q_2 + l_3 \cos(q_1 + q_2 + q_3), \\ x_2^C = l_1 \sin q_1 + l_2 \sin q_2 + l_3 \sin(q_1 + q_2 + q_3); \end{cases} \tag{1}$$

$$q_3 = -\frac{q_2}{2}, \tag{2}$$

$$\begin{cases} x_1^C = l_1 \cos q_1 + l_2 \cos q_2 + l_3 \cos\left(q_1 + \frac{q_2}{2}\right), \\ x_2^C = l_1 \sin q_1 + l_2 \sin q_2 + l_3 \sin\left(q_1 + \frac{q_2}{2}\right); \end{cases} \tag{3}$$

$$\begin{cases} r = 2l_1 \cos\left(\frac{q_2}{2}\right) + l_3, \\ \phi = q_1 - \frac{q_2}{2}; \end{cases} \tag{4}$$

$$\begin{cases} q_1 = \phi + \arccos\left(\frac{r - l_3}{2l_1}\right), \\ q_2 = 2\arccos\left(\frac{r - l_3}{2l_1}\right); \end{cases} \tag{5}$$

$$\mathbf{M}(\mathbf{q})\ddot{\mathbf{q}} + \mathbf{C}(\mathbf{q}, \dot{\mathbf{q}})\dot{\mathbf{q}} + \mathbf{K}(\mathbf{q}) = \mathbf{Q}(t), \tag{6}$$

$$\sum_i (\mathbf{Q}_i - m_i \ddot{\mathbf{r}}_i) \cdot \delta \mathbf{r}_i = 0, \tag{7}$$

$$\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}_i}\right) - \frac{\partial L}{\partial q_i} = Q_i, \quad L = T - \Pi \tag{8}$$

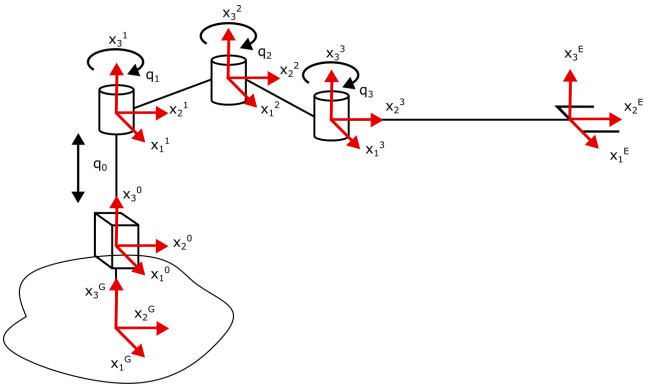

Fig. 1. Kinematic scheme of robot.

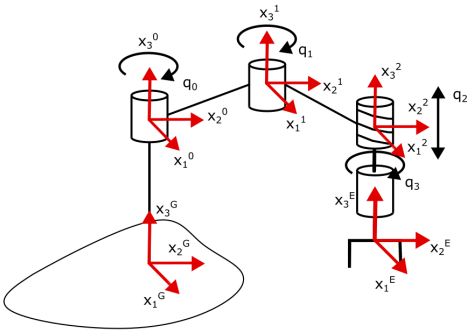

Fig. 2. Classic SCARA robot kinematic scheme.

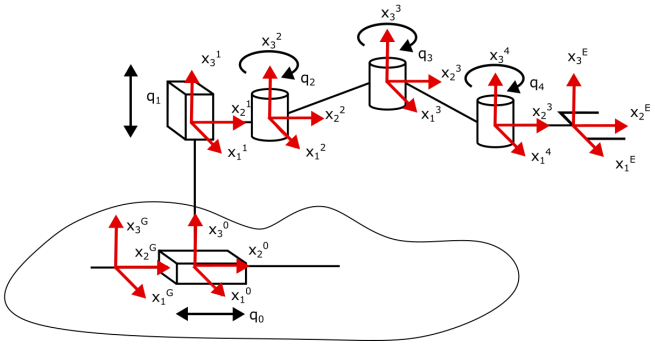

Fig. 3. PreciseFlex 340 robot kinematic scheme.

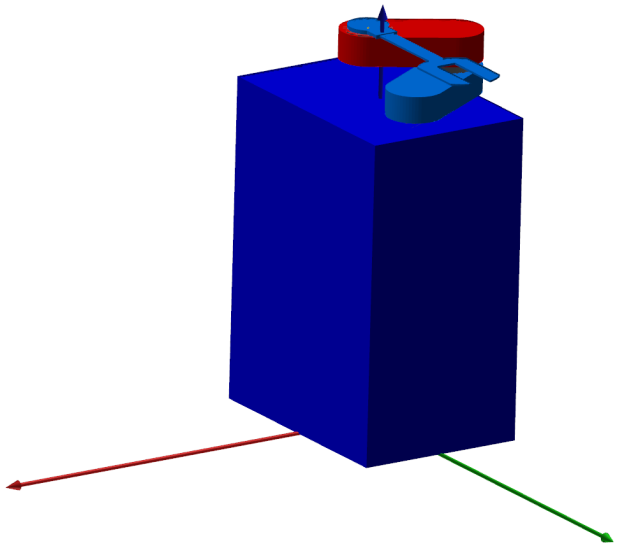

Fig. 4. Exudyn simulation window view.

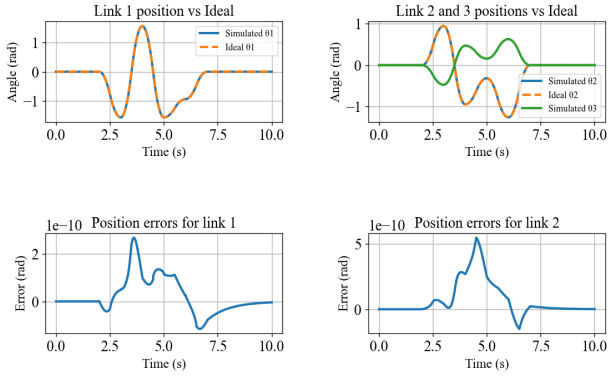

Fig. 5. Joint positions and position errors.