Eliminating F_2 using Eq. (5.25), we can calculate the swimming velocity from Eqs. (5.23a), (5.23b), (5.23c), and (5.24) as

$$\begin{aligned} V_0 &= \frac{1}{3}\left[\left(\frac{1}{a_1}-\frac{1}{a_2}\right)+\frac{3}{2}\left(\frac{1}{L_1+L_2}-\frac{1}{L_2}\right)\right]\left(\frac{F_1}{6\pi\mu}\right)+ \\ &\quad \frac{1}{3}\left[\left(\frac{1}{a_3}-\frac{1}{a_2}\right)+\frac{3}{2}\left(\frac{1}{L_1+L_2}-\frac{1}{L_1}\right)\right]\left(\frac{F_3}{6\pi\mu}\right), \end{aligned} \tag{5.26}$$

where the subscript 0 denotes the force-free condition. To close the system of equations, we should either prescribe the forces (stresses) acting across each linker, or alternatively the opening and closing motion of each arm as a function of time. We choose to prescribe the motion of the arms connecting the three spheres, and assume that the velocities

$$\dot{L}_1 = v_2 - v_1, \tag{5.27a}$$

$$\dot{L}_2 = v_3 - v_2, \tag{5.27b}$$

are known functions. We then use Eqs. (5.23a), (5.23b), (5.23c), and (5.25) to solve for F_1 and F_3 as a function of $\dot{L}_1$ and $\dot{L}_2$. Putting the resulting expressions for F_1 and F_3 back in Eq. (5.26), and keeping only terms in the leading order in a_i/L_j consistent with our original scheme, we find the average swimming velocity to the leading order.