We can now define a Lighthill hydrodynamic efficiency as

$$\mu_{\rm L} \equiv \frac{18\pi\mu a_R \overline{V_0}^2}{\overline{\mathcal{P}}}, \tag{5.48}$$

for which we find to the leading order

$$\mu_{\rm L} = \frac{9}{8}\frac{a_R}{a}\frac{K^2\,\overline{(u_1\dot{u}_2 - \dot{u}_1 u_2)}^2}{C_1\,\overline{\dot{u}_1^2} + C_2\,\overline{\dot{u}_2^2} + C_3\,\overline{\dot{u}_1\dot{u}_2}}, \tag{5.49a}$$

where

$$C_1 = 1 + \frac{a}{\ell_1} - \frac{1}{2}\frac{a}{\ell_2} + \frac{a}{\ell_1+\ell_2}, \tag{5.49b}$$

$$C_2 = 1 - \frac{1}{2}\frac{a}{\ell_1} + \frac{a}{\ell_2} + \frac{a}{\ell_1+\ell_2}, \tag{5.49c}$$

$$C_3 = 1 - \frac{1}{2}\frac{a}{\ell_1} - \frac{1}{2}\frac{a}{\ell_2} + \frac{5}{2}\frac{a}{\ell_1+\ell_2}. \tag{5.49d}$$