

Next, we use the expressions for $\langle \tau^2 \rangle$ (see Eq. (30)), and derive $\langle \tau^3 \rangle = -(\gamma/2)\tau_0^2\sqrt{\omega^2 - \omega_c^2} + \gamma^3\omega^2(\omega - \sqrt{\omega^2 - \omega_c^2})$. Substituting these expressions together with with Eq. (33) into Eq. (32), we find that the effective diffusion coefficient can be written as

$$D_{eff} = \frac{k_B T}{\gamma} f(r) \quad (34)$$

where $r = \frac{\omega_c}{\omega}$ and where $f(r)$ is given by

$$f(r) \approx \frac{1}{\sqrt{1-r^2}} + \frac{2\sqrt{1-r^2}}{1+\sqrt{1-r^2}} \left[r^2 + \frac{5}{4}r^4 \left(1 + \frac{1}{1+\sqrt{1-r^2}} \right) \right]. \quad (35)$$

Acknowledgments

We thank J. Lipfert and M. Versteegh for fruitful discussions, J. van der Does, D. de Roos and J. Beekman for help with instrumentation and infrastructure, and TU Delft, FOM (Dutch Foundation for Research on Matter), and the European Science Foundation for financial support.