A slowing down mechanism in relaxing wormlike micellar networks

Marco Baiesi[1,2], **Stefano Iubini**[3,4], **and Enzo Orlandini**[1,2]

[1] *Dipartimento di Fisica e Astronomia, Università di Padova, via Marzolo 8, I-35131 Padova, Italy*

[2] *INFN, Sezione di Padova, via Marzolo 8, I-35131 Padova, Italy*

[3] *Consiglio Nazionale delle Ricerche, Istituto dei Sistemi Complessi, via Madonna del Piano 10, I-50019 Sesto Fiorentino, Italy*

[4] *INFN, Sezione di Firenze, via G. Sansone 1, I-50019 Sesto Fiorentino, Italy*

Micellar networks are an important example of viscoelastic media with nontrivial relaxation and response properties. A mean-field kinetic model [1] supports a picture suggested earlier by numerical results [2]: the relaxation of a perturbed micellar network is a complex process in which branching (or cross-linking) first overshoots and then slowly reaches equilibrium, while the number of free end-caps remains in transient local equilibrium with branching. The kinetic equations of the model account for the scission and synthesis of wormlike and cross-linked portions of the surfactant network. They lead to the same mechanisms for the relaxation after abrupt thermal quenches and small mechanical perturbations, which indeed share some similarity in their phenomenologies. We speculate on possible underestimates of the typical time scales of viscoelastic fluids, due to the difficulty of detecting the subtle effects of the end-recombination dynamics.

[1] M. Baiesi, S. Iubini, E. Orlandini, J. Chem. Phys. **155**, 214905 (2021).

[2] S. Iubini, M. Baiesi, E. Orlandini, Soft Matter **16**, 9543 (2020).