Supporting Information for: "Supercoiling DNA with a free end"

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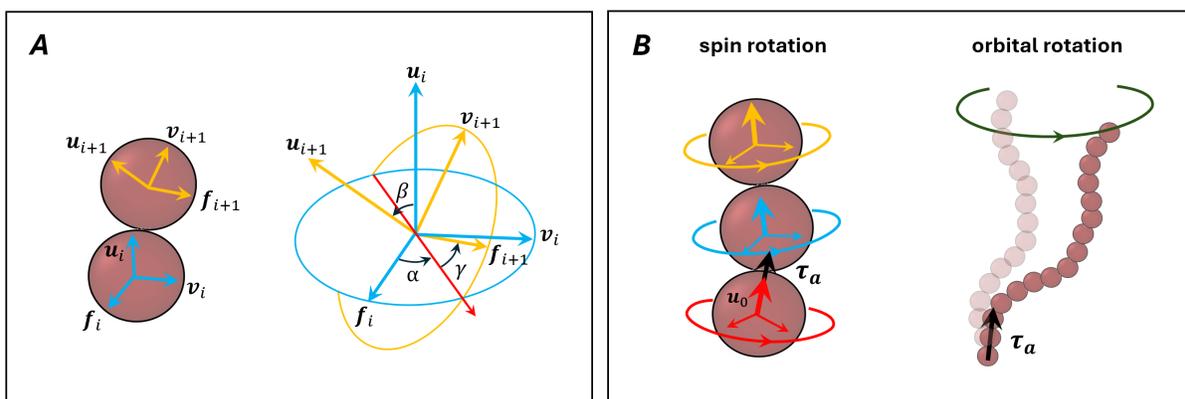
Supplementary Figures

Figure S 1: (A) Definition of the Euler angles (on the right) specifying the orientation of the (i+1)-th polymer bead's local frame, $\{\mathbf{f}_{i+1}, \mathbf{v}_{i+1}, \mathbf{u}_{i+1}\}$, relative to the i-th polymer bead's frame, $\{\mathbf{f}_i, \mathbf{v}_i, \mathbf{u}_i\}$ (on the left). (B) On the left, scheme depicting the direction of the spin rotation for each bed, $\boldsymbol{\omega}_i$, projected along $\mathbf{u}_i$, due to the application of a torque $\tau_a \parallel \mathbf{u}_0$ on the first bead. Note that in general $\boldsymbol{\omega}_i$ is determined by Eq.2 from the main text, and is not necessarily directed along $\mathbf{u}_i$. However, to evaluate the chain spinning around itself, one needs to evaluate the projection on the chain tangent (i.e. the rotation of each bead around the $\mathbf{u}_i$ axis). On the right, depiction of orbital rotation $\boldsymbol{\Omega}$, where the entire coil whirls as a single unit around the rotational axis, projected in the direction of $\tau_a \parallel \mathbf{u}_0$. Note that the projection along either $\mathbf{f}_0$ or $\mathbf{v}_0$ gives negligible values.
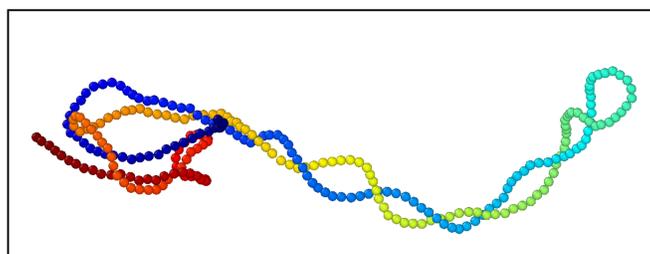

Figure S 2: Configuration of a plectoneme for a 2kbp chain at $\tau_a = 6$.

Supplementary Movies

The five supplementary movies S1-S5 correspond to the application of five active torque values, $\tau_a = [0, 1, 2, 3, 6]$, starting from an initially equilibrated configuration at $\tau_a = 0$. The chain length is 2kbp, and the trajectories are the same as those depicted in Fig.1 of the main text. All movies display time on a logarithmic scale, with units given in t_{MD}. The center of mass of the polymer chain is constrained to remain at the geometric center of the simulation box throughout each trajectory.