Supplemental Material for "Stationary particle currents in sedimenting active matter wetting a wall"

Matthieu Mangeat,[1] Shauri Chakraborty,[1] Adam Wysocki,[1] and Heiko Rieger[1,2]

[1] *Center for Biophysics & Department for Theoretical Physics, Saarland University, D-66123 Saarbrücken, Germany.*

[2] *INM – Leibniz Institute for New Materials, Campus D2 2, D-66123 Saarbrücken, Germany.*

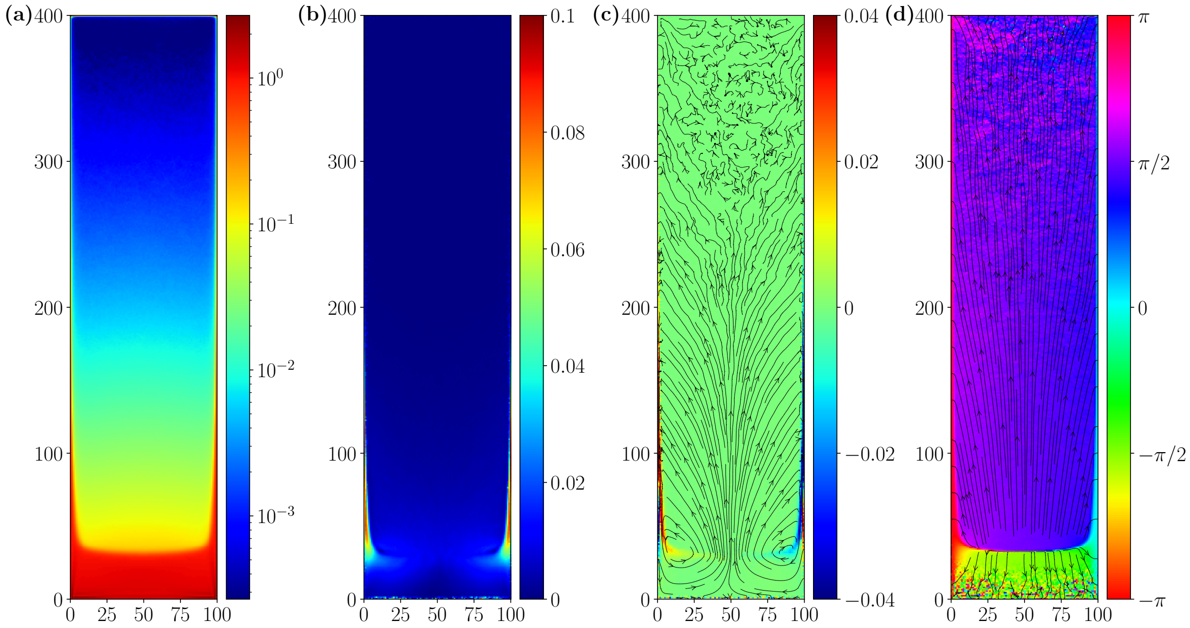

FIG. S1: [Reproduction of Fig. 1 with a view of the entire domain] Stationary state of ABPs in a box with reflecting walls. Box dimension is 100×400, particle number is 5000, gravity is in $-\hat{y}$ direction, $F_0 = 100$, $\mathrm{Pe}_s = 30$, and $\mathrm{Pe}_g = 6$. Shown quantities are time-averaged. (a) Particle density $\rho(x, y)$. (b) Modulus of the current density $|\mathbf{J}(x, y)|$. (c) Curl amplitude $A(x, y)$ together with arrows indicating current orientation $\phi_J(x, y)$. (d) Average particle orientation $\bar{\theta}(x, y)$. Quantities become more noisy with increasing y, due to the lack of particles for a fixed time-averaging window (density presents an exponential decay with y in the dilute region).

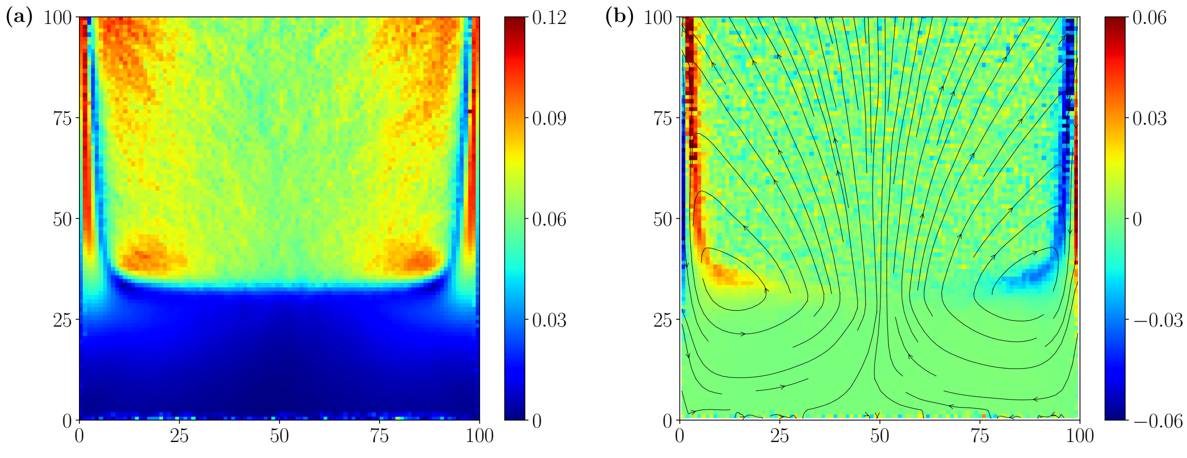

FIG. S2: Stationary state of ABPs in a box with reflecting walls. Box dimension is 100×400, particle number is 5000, gravity is in $-\hat{y}$ direction, $F_0 = 100$, $\mathrm{Pe}_s = 30$, and $\mathrm{Pe}_g = 6$. Shown quantities are time-averaged. Here we consider the averaged velocity defined as $\mathbf{V} = \mathbf{J}/\rho$. (a) Modulus of the velocity $|\mathbf{V}(x, y)|$. (b) Curl amplitude $\partial_x V_y - \partial_y V_x$ together with arrows indicating velocity orientation $\phi_V(x, y)$, such that $\mathbf{V} = (\cos\phi_V, \sin\phi_V)$.

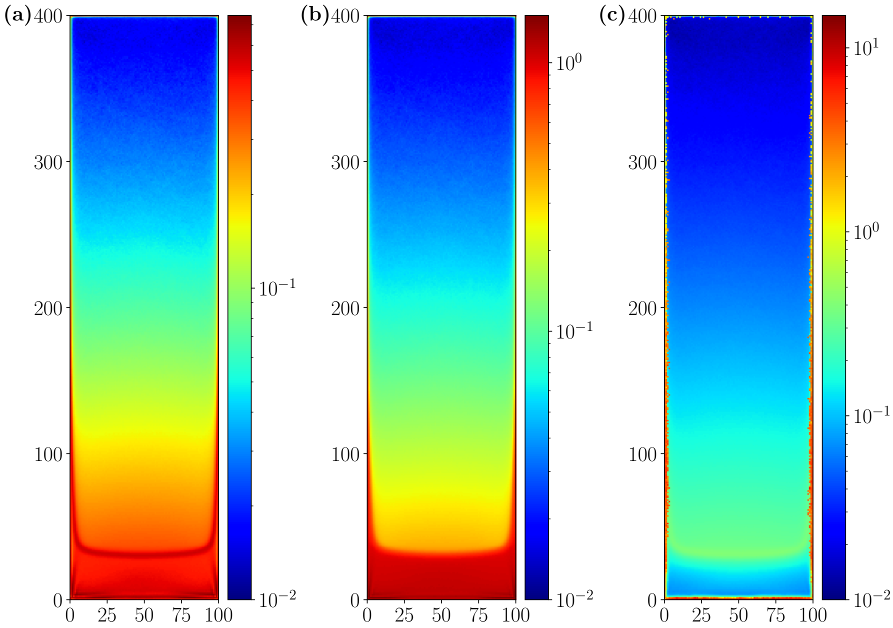

FIG. S3: Temporal fluctuations of the stationary state quantities shown in Fig. 1: (a) Standard deviation of the particle density $\sigma_\rho = \sqrt{\langle \rho^2 \rangle_t - \langle \rho \rangle_t^2}$, where $\langle \cdot \rangle_t$ denotes the average over time. (b) Standard deviation of the polarization $\sigma_P = \sqrt{\langle \mathbf{P}^2 \rangle_t - \langle \mathbf{P} \rangle_t^2}$. (c) Standard deviation of the current density $\sigma_J = \sqrt{\langle \mathbf{J}^2 \rangle_t - \langle \mathbf{J} \rangle_t^2}$.