README for Data from "Heterogeneous Solvent Dissipation Coupled with Particle Rearrangement in Shear-Thinning Non-Brownian Suspensions"

We have submitted the data derived from simulations using the Smoothed Profile Method for two-dimensional Non-Brownian suspensions, as presented in the figures of the paper titled "Heterogeneous Solvent Dissipation Coupled with Particle Rearrangement in Shear-Thinning Non-Brownian Suspensions" by Tomoharu Terayama and Akira Furukawa, published in Soft Matter. This document provides detailed explanations of the format of the uploaded data.

1. Figure 1:

   - The file fig1a.zip contains three data files. Each file is named dgamma_x.dat, where x=20000, 2000, and 250, representing the inverse of the imposed shear rate ($\dot{\gamma}^{-1}$). Each data file consists of two columns: the first column lists the area fraction of the particles (ϕ), and the second column lists the viscosity (η) measured through the wall stress. The viscosity is calculated as $\eta = (1/\dot{\gamma}L)\int \mathrm{d}x\langle\Sigma_{xy}(x, \pm L/2)\rangle$, where $\Sigma_{xy}(x, \pm L/2)$ is the xy component of the stress tensor at the walls.
   - In fig1b.zip, six data files in CSV format are included. Each data file is named phi_x.csv, where x=0.14, 0.27, 0.41, 0.54, 0.64, and 0.68, representing the area fraction of particles. Each data file consists of three columns: The first column lists the shear rate $\dot{\gamma}$. The second column lists the viscosity measured through the wall stress (please refer to the description above). The third column lists the viscosity measured through the dissipation rate as described in Eq. (13).

   For definitions and further details, please refer to the main text.

2. Figure 2:

   In fig2.zip, there are 12 data files named fig2x.csv (x=a, b, c, ..., l), each corresponding to a subfigure of Fig. 2(x). Each data file consists of four columns. The first and second columns contain the values i and j, which relate to the x and y components of the lattice coordinates, respectively (for details, see below). The third and fourth columns describe the x and y components of the velocity field, respectively.

   - These velocity fields are assigned on the staggered lattice: vx[i][j] and vy[i][j] are located at $(i - L/2, j - (L+1)/2)$ and $(i - (L+1)/2, j - L/2)$, respectively.
   - For the x-direction, the working space is $-L/2 \leq x < L/2$, and periodic boundary conditions are imposed. In these csv files, the data are stored as follows: vx[0][j]=vx[L][j], vy[0][j]=vy[L][j], vx[L+1][j]=vx[1][j], and vy[L+1][j]=vy[1][j].
   - At $y = -L/2$ and $y = L/2$, there are boundary walls, for which vy[j][0]=vy[j][L]=0. Unphysical values are stored for vy[i][L+1], which were not used in actual simulations. Furthermore, vx[i][0] and vx[i][L+1] are the x components of the velocity field at $(i - L/2, -(L+1)/2))$ and $(i - L/2, (L+1)/2)$, respectively, which are outside the walls. These values are determined to satisfy the stick boundary conditions, $v_x = -\dot{\gamma}L/2$ and $v_x = \dot{\gamma}L/2$, respectively.

   Additionally, in fig2.zip, there is a single .dat file named Pos_Vel_2000000.dat, which is used to generate Fig. 2(k'). This file consists of five columns. The first and second columns list the x and y coordinates of the particle's center of mass, respectively. The third column lists the particle's radius. The fourth and fifth columns list the x and y components of the particle velocity, respectively. These data are restricted to the particles not located on the walls and are taken at the same time as those in fig2k.csv.

   For definitions and further details, please refer to the main text.

3. Figure 3:

   In fig3.zip, there are 3 data files in CSV format. Each data file is named fig3x.csv, where x=a, b, c, corresponding to a subfigure of Fig. 3.

   In each data file:

   - The first column lists $i_2/(\eta_s\dot{\gamma}^2)$.
   - From the second to seventh column, the values of the probability distribution $p(i_2/\dot{\gamma}^2)$ are provided for $\dot{\gamma} = 2 \times 10^{-3}$, 10^{-3}, 2×10^{-4}, 10^{-4}, 2×10^{-5}, 10^{-5}, and 2×10^{-6}, respectively.
   - In fig3c.csv, an additional 8th column lists the distribution for $\dot{\gamma} = 10^{-6}$.

   For definitions and further details, please refer to the main text.

4. Figure 4:

   In fig4.zip, there are 6 data files in CSV format. Among them, four data files are named fig4x.csv, where x=a, b, c, and d, corresponding to a subfigure of Fig. 4. In each data file:

   - The first column lists the value of the scaled wave number $k/2\pi$.
   - Starting from the second column, each column lists the value of the structure factor $S(k)$ for the shear rate denoted in the first line of each column as dg. For example, dg=1.0e-06 represents $\dot{\gamma} = 10^{-6}$. The same format is used for the other columns.

   Additionally, two data files are named fig4x_inset.csv, where x=c and d, corresponding to an inset of a subfigure of Fig. 4. In each data file:

   - The first column lists the value of the shear rate $\dot{\gamma}$.
   - The second column lists the value of the correlation length ξ.

   For definitions and further details, please refer to the main text.

5. Figure 5:

   In fig5.zip, there are two data files in CSV format. Each data file is named fig5x_y.csv, where (x,y) = (c, e) and (d, f). In the Fig5c_e.csv file, the first and second columns contain the x and y coordinates of the representative position of each triangle, in the form $x + L/2$ and $y + L/2$, respectively, with L being the system size ($L = 512$). On the other hand, the third and fourth columns describe the values of $I_1/\dot{\gamma}$ and $I_2/\dot{\gamma}^2$, corresponding to Figs. 5(e) and 5(c), respectively. The same format is applied to the Fig5d_f.csv file.

   For definitions and further details, please refer to the main text.