Data Guide for *Protocol-Dependence and State Variables in the Force-Moment Ensemble* E. S. Bililign, J. E. Kollmer, & K. E. Daniels. *Physical Review Letters.*

File Location The files associated with these experiments are located in the following zipped directories:

1. Biaxial: `DataDryad‣biaxial.tgz`
2. Uniaxial: `DataDryad‣uniaxial.tgz`
3. Shear: `DataDryad‣shear.tgz`[1]

Additionally, figures from the paper may be found in `DataDryad‣figures.tgz` in both `.fig` and `.eps` format.

File Structure Within each directory, the jth frame of the ith experiment has two associated files:

1. Forces: `img[i]-[j]solved.mat`; output from `PEGS`[2]
2. Volumes: `img[i]-[j]voro.txt`; output from `voro++`[3]

Force data is recorded as a `Matlab` structure of dimension $1 \times N$ where N is the number of particles observed in the system. The useful fields are detailed in the table below:

Name	Description
`id`	particle label; not consistent between frames
`x`, `y`	x and y position coordinates in pixels (5.037 pixels/mm)
`r`, `rm`	particle radii in pixels and meters, respectively
`z`	number of force-sustaining contacts
`g2`	square of the intensity gradient, a measure of net stress on a particle
`forces`, `betas`, `alphas`	three ($z \times 1$) vectors of force magnitudes (f), and angles (β, α), respectively
`neighbors`	($z \times 1$) vector of neighbor indices; indices $-1, -2, -3, -4$ refer to bounding walls
`fitError`	measure of least-squares error in fringe fitting

[1] In the notation of the paper, (i=1, j=1-367) and (i=2, j=1-379) are shear^A and (i=2, j=380-821) are shear^B.

[2] Code available at: `https://github.com/jekollmer/PEGS/`, data analyzed with v. 2016.09.28

[3] Code available at: `http://math.lbl.gov/voro++/`, data analyzed with v. 0.3.1

The force on a particle due to a neighbor is parametrized by (f, α, β), as represented by Figure 1. Then, the vector force on a particle from a single contact is

$$\vec{F} = f\cos(\alpha+\beta)\hat{x} + f\sin(\alpha+\beta)\hat{y},$$

where the normal and tangential components of the force are:

$$F_n = f\cos(\alpha),$$
$$F_t = f\sin(\alpha).$$

Volume data is stored as a text file N rows and columns detailed in the table below:

Column	Description
1	particle label; matches with associated force `id`
2-4	position coordinates, (x, y, z), in pixels
5	particle radii in pixels
6	Voronoi cell volume in square pixels
7-	list of neighboring Voronoi cells; indices $-1, -2, -3, -4$ refer to bounding walls

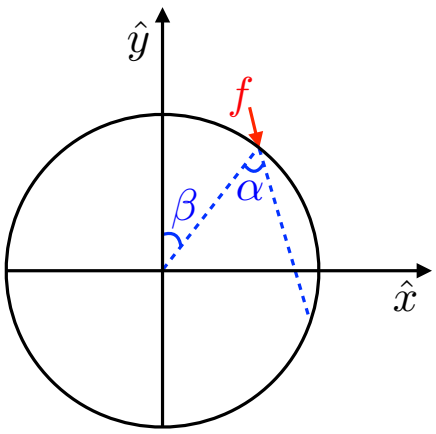

Figure 1: Simplified force diagram for a single force of magnitude f acting on a particle, defined by two angles α and β.