Time dependent anisotropic diffusion of an *asymmetric particle* in *ageing viscoelastic fluid* (Soft Matter Physics)

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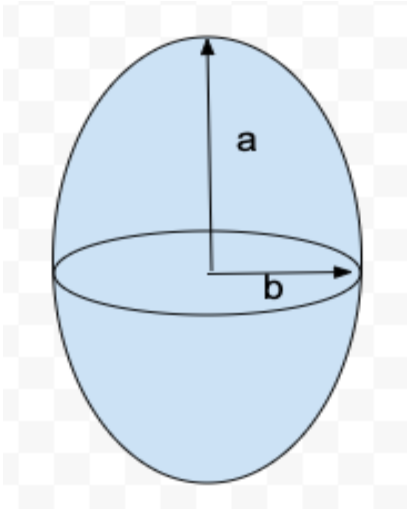


Mediums:
Viscous- Glycerol, water
Viscoelastic- glass,mucus, gels, certain polymer melts.
Ageing viscoelastic-paints, nepolite, surfactant solution.

Project Objective:

- Theory Part already well estabilished by others: Einstein(1905), Perrin(1932) and others.
- Our task is : (A) **Simulation** as per theory says (B) **Experimentation** to examine its success
    - Central Goal is : *Time Dependent Anisotropic Diffusion*

Project Planning:

We will start with:

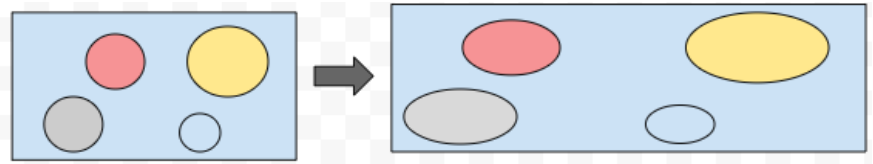
- Spherical particle in viscous, viscoelastic and 'ageing viscoelastic' fluids.
- **Ellipsoidal particle** in viscous, viscoelastic and '**ageing viscoelastic**' fluids.

Simulation:

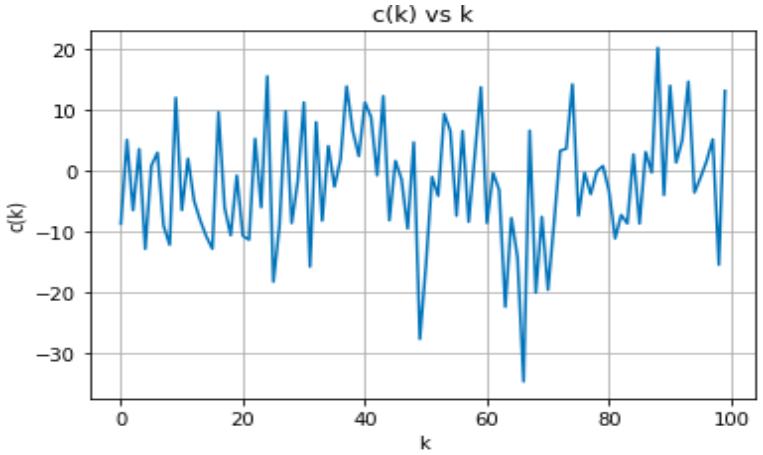
- Algorithms depends on 'geometry of particle' as well as suspension 'medium'.
- All of them requires uncorrelated random numbers (some time Gaussian Distributed numbers).
- Generated using Psuedo Random number Generator(PRNG) in PYTHON. Then I checked for required featured in PRNG.
- Determined Mean square displacement(MSD) from simulation(It quantify Diffusion process).
- Used fixed time step and variable time step method.

Experimentation:

- Preparation of ellipsoidal particle of different dimension in our lab.
- ➢ Tracing particle trajectory using Video Microscopy and then determine MSD.
- ➢ Experimental setup:



Polystyrene sphere streched to ellipsoid



Results till now

Diffusion coeeficient coming within 2% error from theoretical value.