Instructions to Run the Viscoelastic Lubricant Transfer Code

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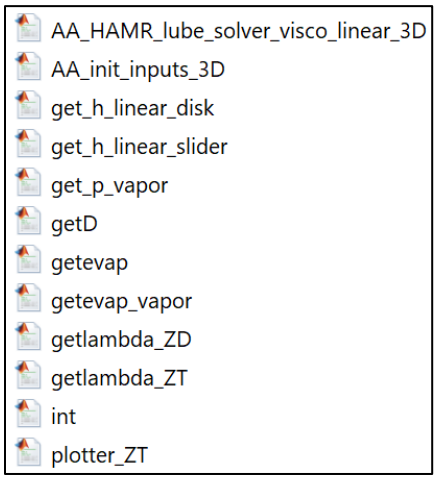
1. Instructions

You will require the following files:



All the input parameters are specified in the file AA_init_inputs_3D. In particular,

```
lrad = NFT Laser beam (on disk) full width half maximum [m]
dx_dim, dy_dim = grid size along X (down-track) and Y (cross-
track directions)
h0 = Initial lubricant thickness [m]
Tmax_disk = Maximum temperature on disk [C]
Tmax_slider = Maximum temperature on slider [C]
ux = Disk speed [m/s]
M = Lubricant molecular weight [kg/mol]
rho = Lubricant density [kg/m3]
tf = Final time [s]
dt = Time step [s]
s_interval = determines how many time steps for which the
solution will be saved in the workspace
G0_lube = Lubricant thin-film shear modulus [MPa]
fh = Head-disk spacing, normalized by h0
lube_name = 1 for Zdol, 2 for Ztetraol
```

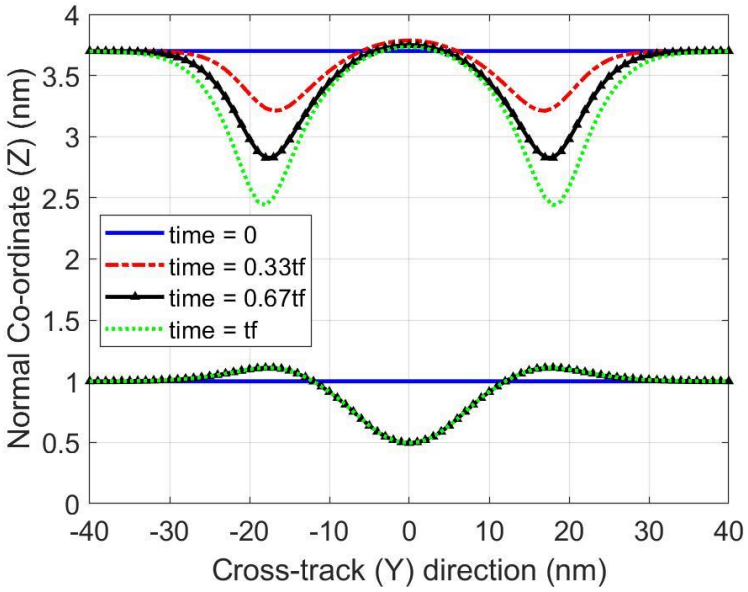
After entering the desired input parameters, just run the AA_HAMR_lube_solver_visco_linear_3D.m file using MATLAB.

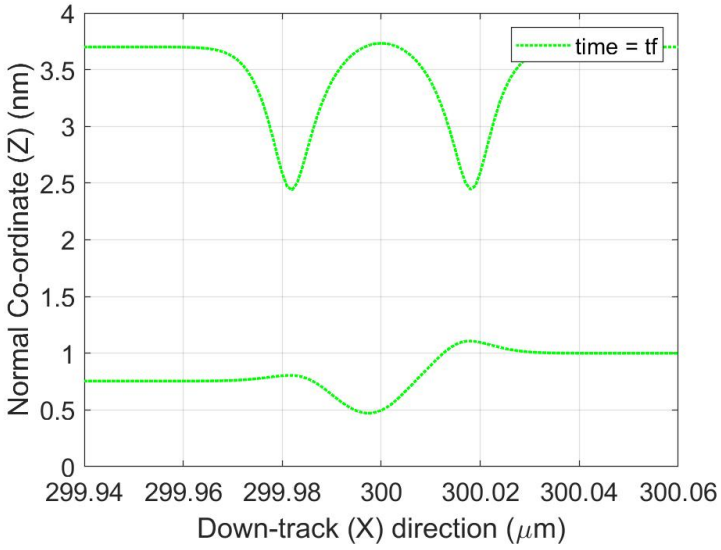
Once the code is finished running, run the plotter.m file for plotting the solution.

2. Baseline Result

The baseline simulation result for the following input parameters is plotted below.

```
lrad = 20e-9
dx_dim, dy_dim = 1e-9
h0 = 1e-9
Tmax_disk = 500
Tmax_slider = 300
ux = 10
M = 2.7
rho = 1600
tf = 30e-6
dt = 1e-10
s_interval = 100
G0_lube = 0.5e6
fh = 4e-9/h0
lube_name = 2
```





The disk lubricant profile, normalized by h0 is stored in the array:
`h_lube_disk(x_index,y_index,time_index)`

The slider lubricant profile, normalized by h0 is stored in the array:
`h_lube_slider(x_index,y_index,time_index)`

The x co-ordinate, normalized by `lrad` is stored in the array: `x(x_index)`

The y co-ordinate, normalized by `lrad` is stored in the array: `y(y_index)`

The `time_index` ranges from 1 to `tf/dt/s_interval`, which corresponds to time ranging from `s_interval*dt*ts` seconds to `tf*ts` seconds

For further details, please see Ref. [1], [2].

3. References

[1] **S. V. Sakhalkar** and D. B. Bogy, "Effect of Rheology and Slip on Lubricant Deformation and Disk-to-Head Transfer During Heat-Assisted Magnetic Recording (HAMR)," *Tribology Letters,* **66**, 145 (2018). https://doi.org/10.1007/s11249-018-1100-4

[2] **S. V. Sakhalkar** and D. B. Bogy, "Viscoelastic Lubricant Deformation and Disk-to-Head Transfer During Heat-Assisted Magnetic Recording," *IEEE Transactions on Magnetics*, **55**, 3300506 (2019). https://doi.org/10.1109/TMAG.2018.2885434