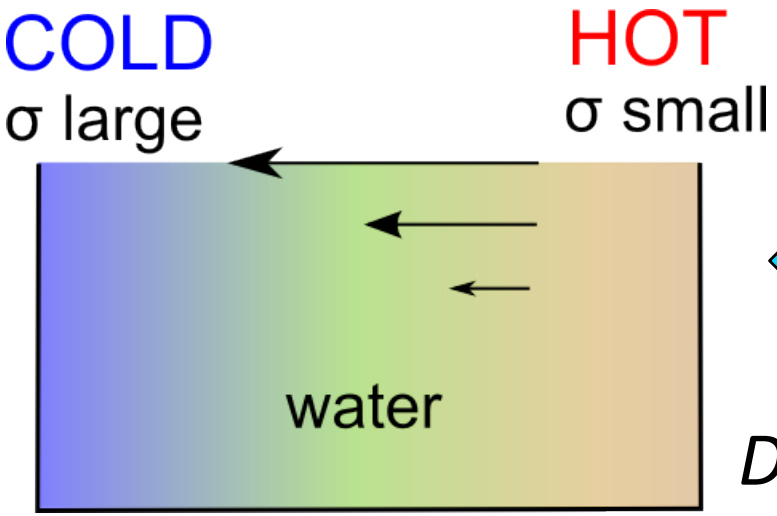
Problem definition

Thermocapillary flow

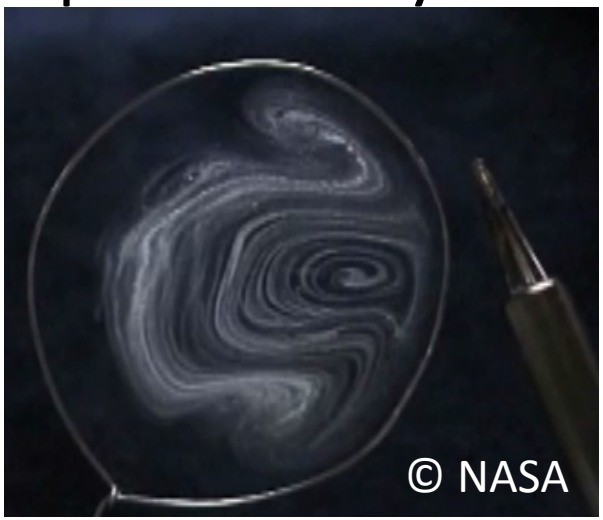
- Thermocapillary flow
  toward cold area
- Experiment on
  International Space Station
  toward hot area



Difference

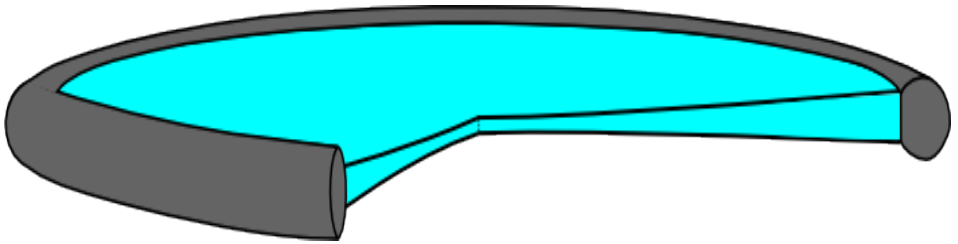
Numerical simulation

Experiment by D. Pettit

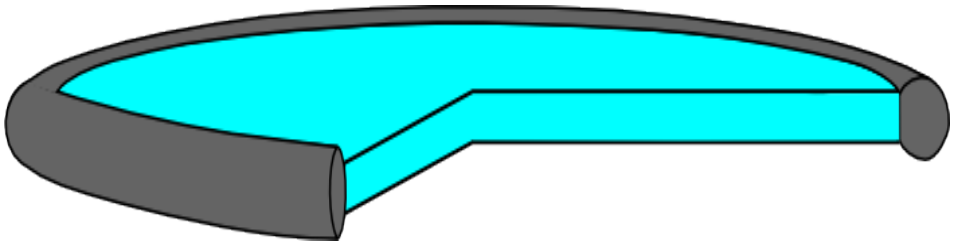


Investigation by
3D numerical simulation

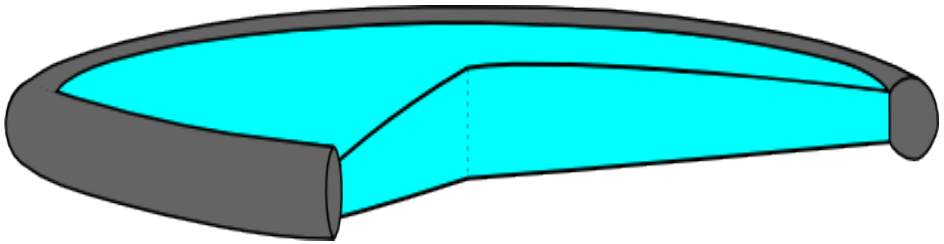
- **Concave film**



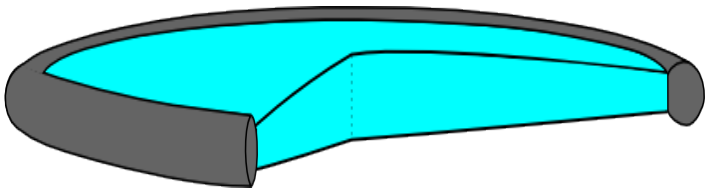
- **Flat film**



- **Convex film**

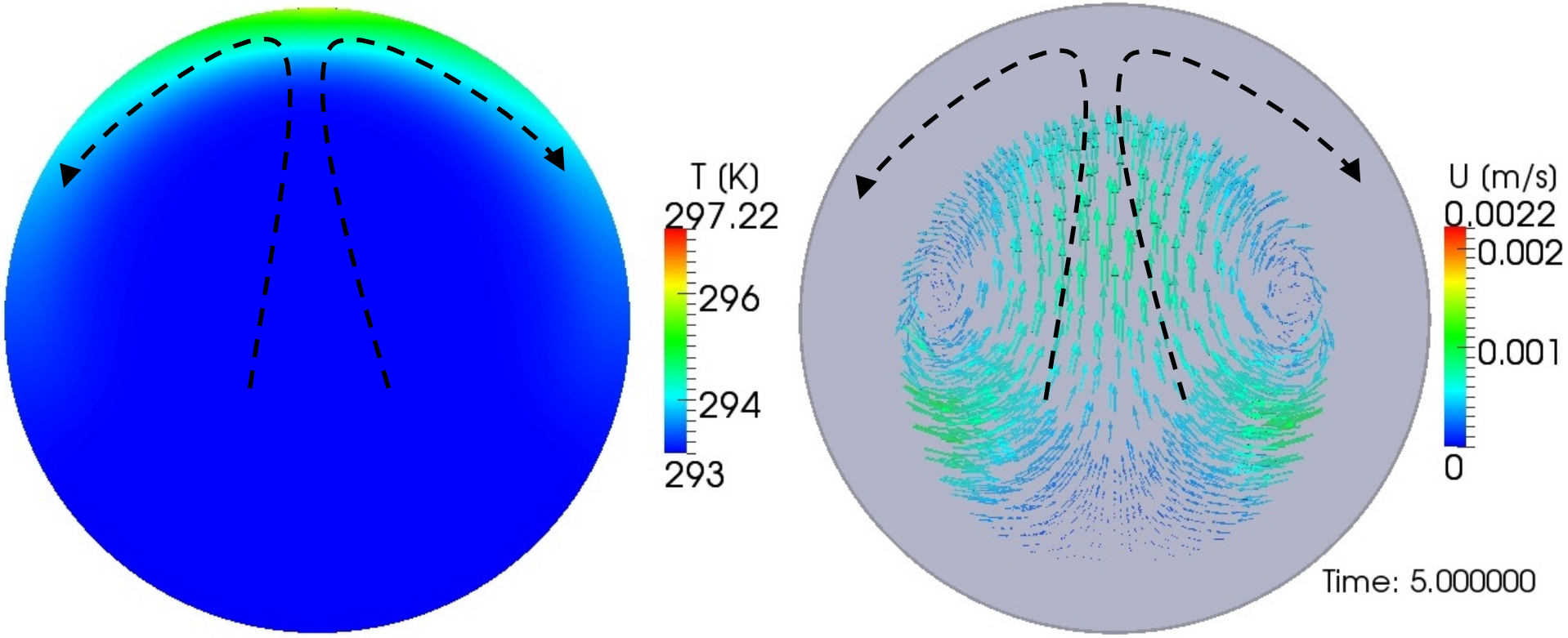


Simulation Results (convex film)



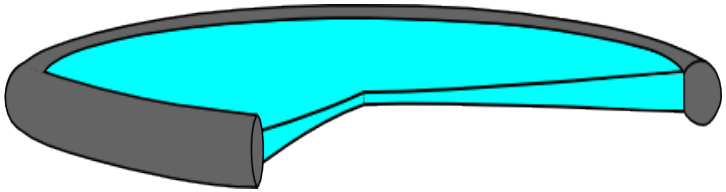
Temp. distribution

Velocity vectors

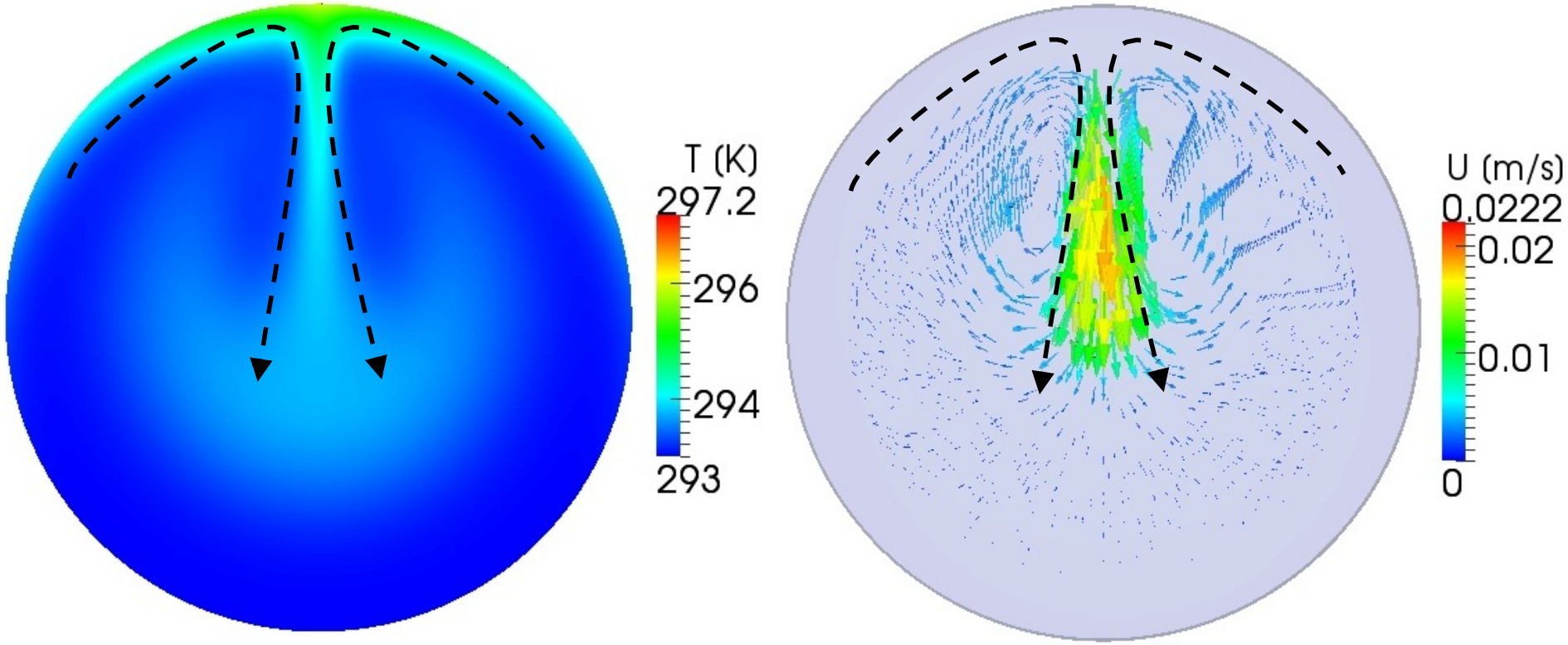


Outward flow = Experimental flow direction

Simulation Results (concave film)



Temp. distribution 5 sec. Velocity vectors



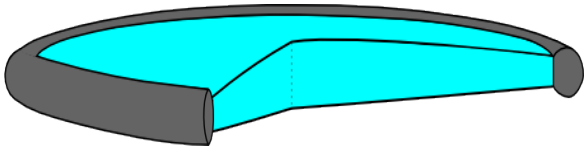
Inward flow ≠ Experimental flow direction

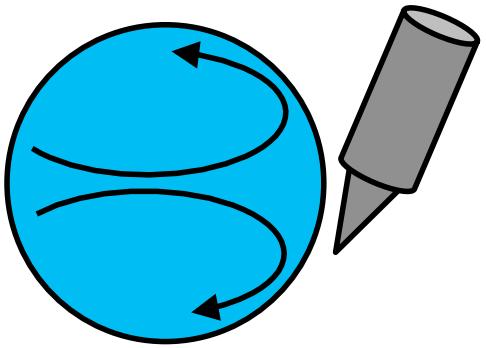
Summary

- **Convex film**

Outward flow developed.

(=Experimental flow direction)





- **Concave film**

Inward flow developed.

(=**NOT** experimental flow direction)