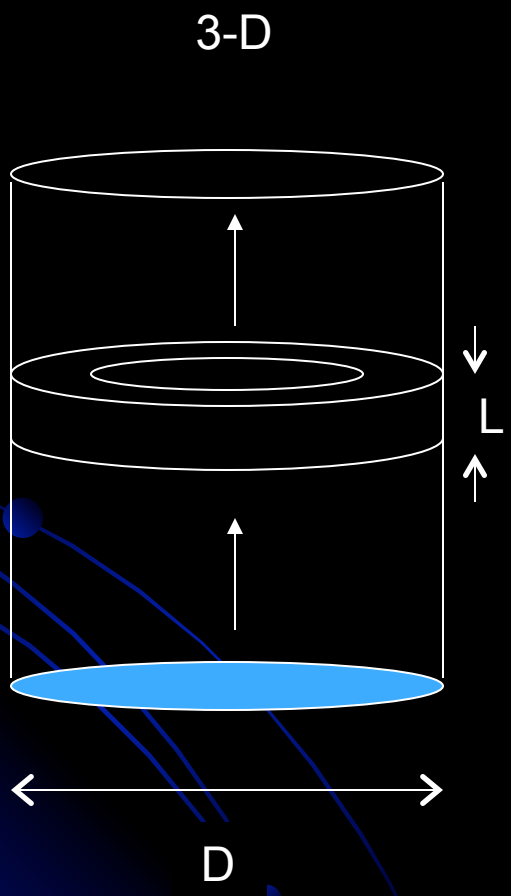
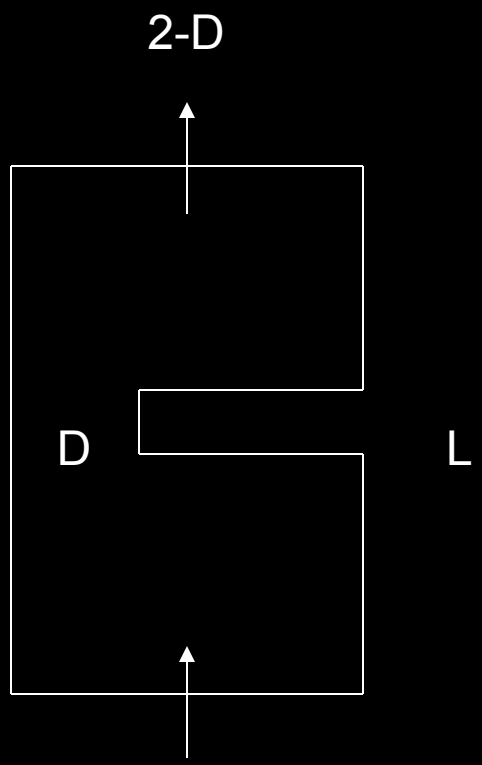
HEAT TRANSFER EFFECT IN SMALL ORIFICES

OBJECTIVES

To characterize the importance of heat transfer effects in the orifice flow

Geometry used in FEMLAB

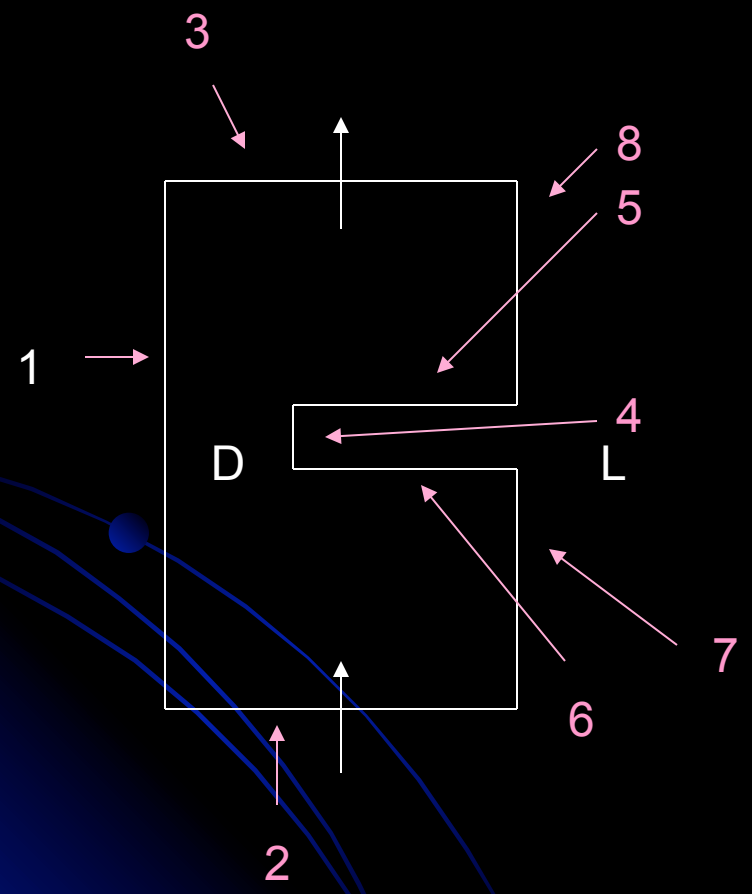




Equations used

- Navier-Stokes equation
- Conduction and Convection equation

Boundary Condition



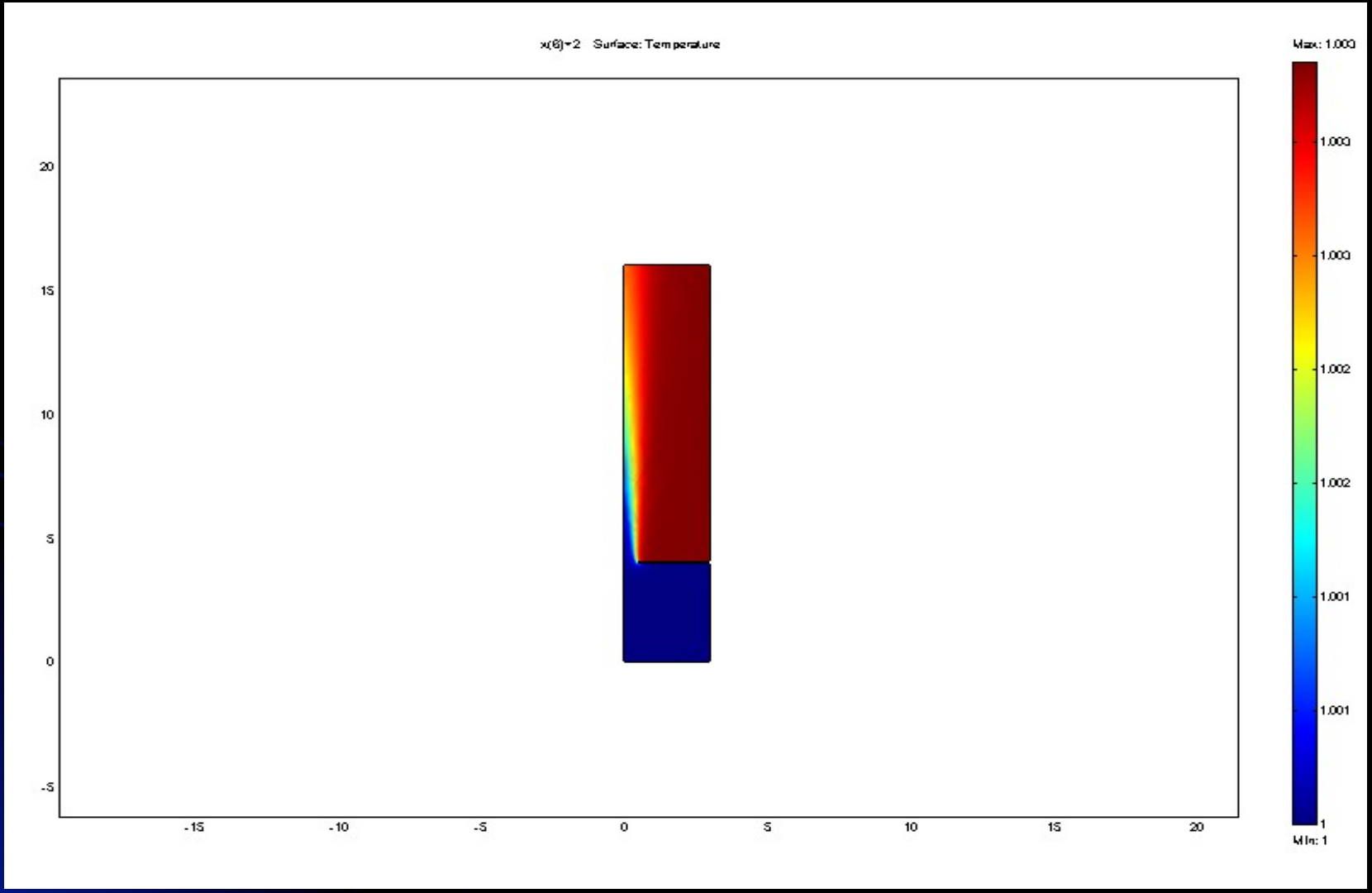
1. Slip/Axial symmetry
2. Inflow velocity/ Temperature
3. Normal flow pressure/ Convective flux
4. No-slip/No-flux
5. No-slip/No-flux
6. No-slip/No-flux
7. No-slip/No-flux
8. No-slip/No-flux

Mesh Refinement

- L/D = 0.092 – consist of 1660 elements
- L/D = 1.14 – consist of 648 elements

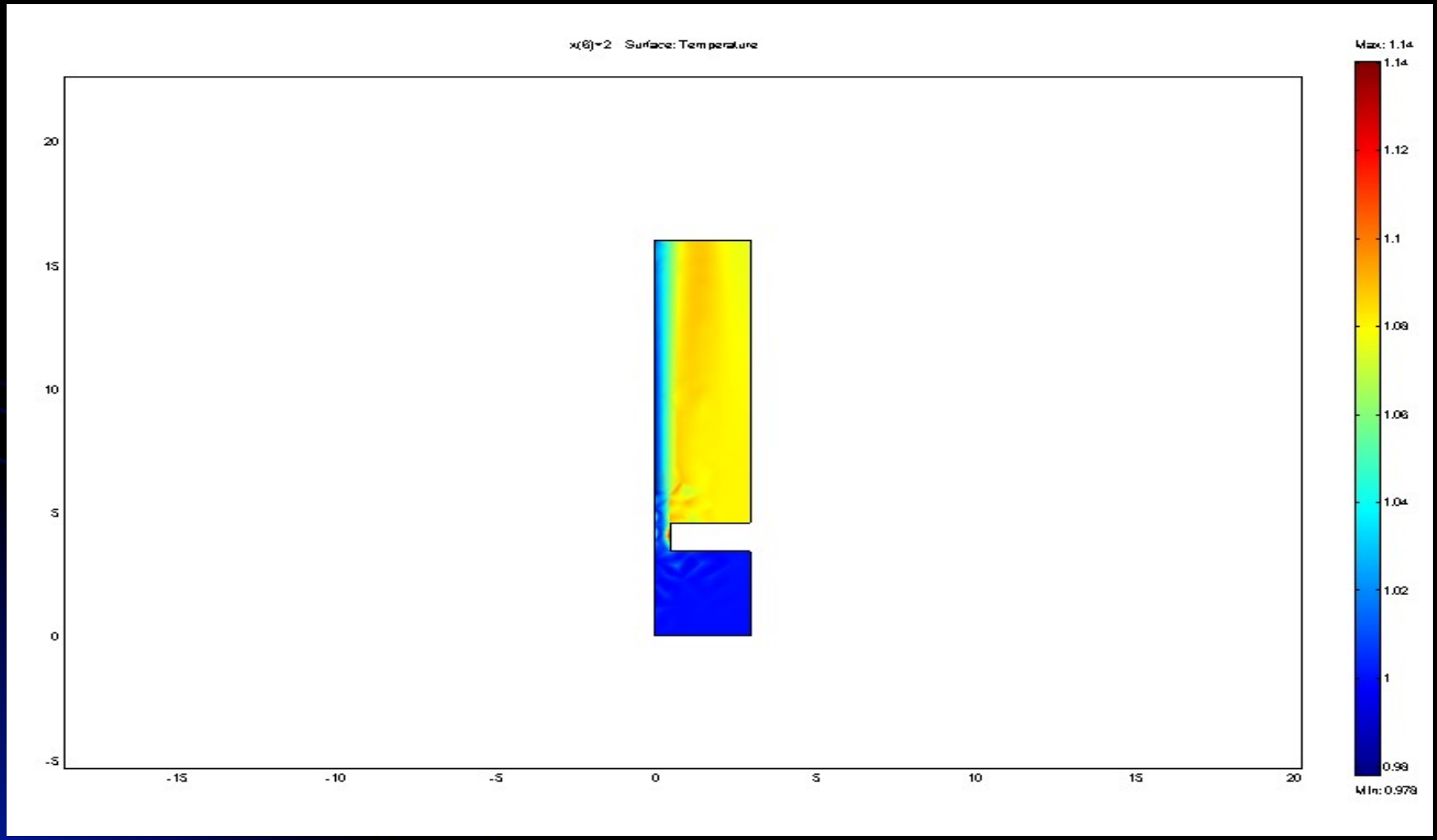
Results

L/D = 0.092 at Re = 100

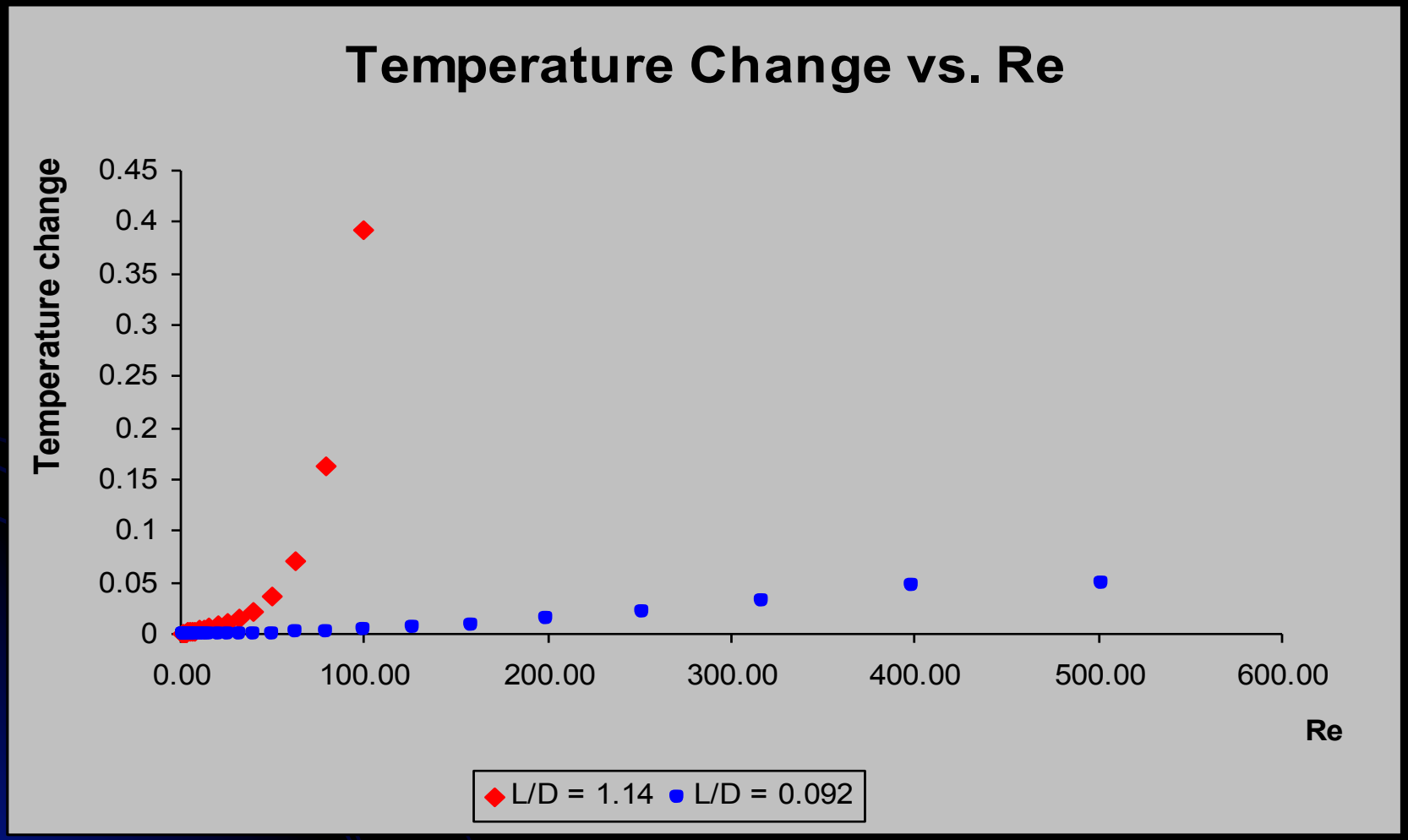


Results cont.

L/D = 1.14 at Re = 1.14



Results cont.



Conclusions

- Not much heat effect on smaller orifice compare to larger orifice along with increasing Reynolds number