**EFFECT OF TEMPERATURE ON WALL SLIP OF A MODEL FLUID**

**Suzanne Lafon 1, Laurent Joly 2, Samy Merabia 2, Alexis Chennevière 3, Frédéric Restagno 1**

1Laboratoire de Physique des Solides, Université Paris-Saclay, Orsay; 2Institut Lumière-Matière, Université Claude-Bernard, Villeurbanne; 3Laboratoire Léon Brillouin, CEA-Saclay

---

**Wall slip boundary condition**

Continuity of stress \( \tau \) at the L/S interface [1]:

\[
\tau_{\text{wall}} = \eta \frac{\partial v}{\partial z} = k V_s
\]

**Viscosity and friction are assumed to be activated processes:**

\[
\eta = \eta_0 e^{E_{a,\text{viscous}}/k_B T}
\]

\[
k = k_0 e^{E_{a,\text{friction}}/k_B T}
\]

**Temperature dependency**

\[
b = \frac{\eta_0}{k_0} e^{(E_{a,\text{viscous}} - E_{a,\text{friction}})/k_B T}
\]

**System and method**

We use a Kob-Andersen [2] fluid sheared by two smooth walls [3].

Lennard-Jones interaction potential

\[
U(r) = 4 \epsilon_{ij} \left[ (\frac{\sigma_{ij}}{r})^{12} - (\frac{\sigma_{ij}}{r})^6 \right]
\]

**Results**

\( b(T) \) can also be described by an activated-like process and its monotony depends on the strength of the L/S interaction.

**Conclusion**

The effect of temperature on slip is not straightforward. For a Kob-Andersen fluid at sufficiently large temperatures, viscosity, friction and slip are activated processes with activation energies \( E_{a,\text{viscous}} \), \( E_{a,\text{friction}} \) and \( E_{a,\text{viscous}} - E_{a,\text{friction}} \) respectively. Therefore, the monotony of \( b(T) \) depends on the sign of this difference of energies, which is a function of the strength of the L/S interaction.

---