We investigate the behaviour of fluids confined between two walls and under the influence of either a temperature gradient, an external gravitational field, or both effects concurrently. This set up allows us to consider the impact of liquid-solid interfaces on the molecular orientation and density profile of the fluid. The gravitational field and/or temperature gradient act in concert with the induced density gradient to generate a preferred orientation in molecular fluids consisting of anisotropic molecules. We illustrate this general phenomenon in a number of anisotropic fluids and extend the non-equilibrium thermodynamics theory to encompass these new effects. Comparison of this gravity induced orientational effect with the recently discovered thermo-molecular orientation (TMO) effect has led to new insights into both phenomena.

References