**ME I0800**

**Homework #4: The Marangoni Effect**

Consider a liquid layer of thickness on a solid plate. The liquid is exposed to ambient air, but the surface tension varies longitudinally along the free surface in the direction, namely The surface tension gradient is affected by a corresponding temperature gradient resulting in fluid motion along the interface.

1. Write the governing equation and boundary conditions for the liquid layer velocity and determine the velocity profile.
2. The dependence of the surface tension on the temperature is given by the relations:

where is a linear temperature distribution, is the surface tension at temperature and is a positive constant.

Determine the induced velocity profile in terms of the temperature gradient for a layer of length with , and the volumetric flow rate.