ABSTRACT

Many industrial processes involve thermal exchanges brought about by the interaction of fine layers of water flowing between two plates.

More precisely, one of the plate communicates thermal flux to the water penetrating in the interplates by means of two orifices. The result is a free distribution of flow rate imposed in the layer, with strong interaction between pressure field and temperature field, because the pressure drops are proportional to the viscosity of the fluid, (T function), function of local temperature inversion (natural convection) and also because the local cooling of the plate is proportional to the flow rates induced by the pressure.

In this study, we have tried to take into account the natural convection in such a flow. This is done by means of Nodal analysis associating a thermal network to a pressure drop network.

The discretized momentum equation have allowed us to introduce a formalism which can be exploited by a software analyser of thermal networks : ASTEC3. But the induced numerical problems force us to fall back on a more tasted method.

Finally, a critical examination of the results has been effectuated. The aim is to decid upon the degree of validity of the proposed model. Morover, modelisation is lenghtly confronted with the experimental accounts.