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Marangoni mixed convection boundary layer flow. (English) Zbl 1158.76430
Meccanica 41, No. 2, 219-232 (2006).

Summary: The paper deals with a steady coupled dissipative layer, called Marangoni mixed convection boundary layer, which can be formed along the interface of two immiscible fluids, in surface driven flows. The mixed convection boundary layer is generated when besides the Marangoni effects there are also buoyancy effects due to gravity and external pressure gradient effects. We shall use a model proposed by *C. Golia* and *A. Viviani* [*Aerotec. Missili Spazio* 64, 29–35 (1985; [Zbl 0589.76118](#)); *Meccanica* 21, 200–204 (1986; [Zbl 0609.76109](#))] wherein the Marangoni coupling condition has been included into the boundary conditions at the interface. The similarity equations are first determined, and the pertinent equations are solved numerically for some values of the governing parameters and the features of the flow and temperature fields as well as the interface velocity and heat transfer at the interface are analysed and discussed.

MSC:

[76R05](#) Forced convection

[76R10](#) Free convection

[76D45](#) Capillarity (surface tension) for incompressible viscous fluids

[76D10](#) Boundary-layer theory, separation and reattachment, higher-order effects

[80A20](#) Heat and mass transfer, heat flow (MSC2010)

Cited in 7 Documents

Keywords:

coupled Marangoni boundary layer; combined convection; numerical solution; immiscible fluids; fluid mechanics

Full Text: [DOI Link](#)

References:

- [1] Napolitano L.G., 'Microgravity fluid dynamics', in: 2nd Levitch Conference, Washington, 1978. · [Zbl 0398.76007](#)
- [2] Napolitano, L.G., 'Marangoni boundary layers', in: Proceedings of the 3rd European Symposium on Material Science in Space, Grenoble, ESA SP-142, June 1979. · [Zbl 0485.76032](#)

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