

Physico-chemical hydrodynamics

English : these works mainly focused on the coupling between thermocapillary and thermogravitational convections. The use of binary alcohol systems presenting unusual dependences of the interfacial or surface tension allowed the study of both positive and negative coupling of the bulk and capillary convections. Some more occasional works have been done on limited studies, like convection implying thermodiffusion (Soret effect), Laser Doppler Velocimetry (LDV), and numerical developments of finite differences algorithms applied to natural convection problems.

Français : ces travaux sont concentrés sur le couplage entre les convections capillaire et thermogravitationnelle. L'utilisation de systèmes présentant une variation inhabituelle de la tension superficielle ou interfaciale a permis l'étude de couplages positif et négatif. Quelques publications concernent des activités plus ponctuelles, tels que la convection avec thermodiffusion, la vélocimétrie laser-Doppler, le développement et l'évaluation d'algorithmes de différences finies appliqués à ces problèmes.

Publications

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- Influence of interfacial tension gradients on thermal convection in two superposed immiscible liquid layers. D. Villers and J.K. Platten, *Applied Scientific Research*, vol. 47, pp. 177-191, 1990.
- Oscillatory Marangoni convection in acetone : earth experiments and theory. D. Villers and J.K. Platten, in « *Materials and Fluid Sciences in Microgravity* », edited by the European Space Agency, vol. SP-295, pp. 305-307, 1990.
- Introduction to thermocapillary convection. J.K. Platten and D. Villers, in « *Proceedings of a Workshop on Wetting Phenomena* », edited by J. De Coninck and F. Dunlop, *Lecture Notes in Physics*, Vol 354, Springer-Verlag, 1990.
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- Thèse de Doctorat, « Couplage entre les convections capillaire et thermogravitationnelle », 1989.
- La vélocimétrie laser-Doppler : un outil indispensable pour l'étude de l'hydrodynamique physico-chimique. J.K. Platten, D. Villers et O. Lhost, *Chimie Nouvelle*, vol. 6(24), pp. 686-692, 1988.
- Thermal convection in superposed immiscible liquid layers. D. Villers and J.K. Platten. *Applied Scientific Research*, vol. 45(2), pp. 145-152, 1988.
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- Thermocapillary convection when surface tension increases with temperature : comparison between numerical simulations and experimental results by LDV. D. Villers and J.K. Platten, in « *Numerical Methods in laminar and turbulent flow* », vol. 5, part 2, pp. 1268-1279, edited by C.

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- Couplage entre les convections capillaire et gravitationnelle dans les mélanges. J.K. Platten, D. Villers, in « Material sciences under microgravity conditions », edited by the European Space Agency, vol. SP-256, pp. 147-150, 1987.
- Separation of Marangoni convection from gravitational convection in earth experiments. D. Villers and J.K. Platten, PhysicoChemical Hydrodynamics, vol. 8(2), pp. 173-183, 1987.
- Marangoni convection in systems presenting a minimum in surface tension. D. Villers and J.K. Platten, PhysicoChemical Hydrodynamics, vol 6(4), pp. 435-451, 1985.
- Rayleigh-Bénard instability in systems presenting a minimum in surface tension. D. Villers and J.K. Platten, in « Material Sciences under Microgravity », edited by the European Space Agency, vol SP-222, pp. 301-305, 1984.
- Heating curves in the two-component Bénard problem. D. Villers and J.K. Platten, Journal of non-equilibrium thermodynamics, vol 9, pp. 131-146, 1984.
- Contributions théorique et expérimentale au problème de Rayleigh-Bénard, Didier Villers, mémoire de licence, 1982.

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