

Abstract Submitted  
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**Imaging isotherms in convecting viscous fluids.** ANNE DAVAILLE, VALERIE VIDAL, JUDITH VATTEVILLE, ANGELA LIMARE, MICHAEL LE BARS, DAMIEN JURINE, CATHERINE CARBONNE, GERARD BIENFAIT — In order to characterize thermal convection patterns in homogeneous and heterogeneous viscous fluids, we have developed a new technique using liquid crystals slurries which enables to image isotherms. When illuminated with white light, a liquid crystals slurry responds over a wide temperature range, and require a high-quality colour camera, and careful calibration and postprocessing to retrieve the temperature data from the images. In viscous fluids, such as sugar syrups or mixtures of salted water and cellulose, convective motions are slow (1 mm/hour to 5 mm/sec), temperature heterogeneities can reach 10-25 ° C, and experiments can run for several weeks. We therefore choose to visualize four different “ isotherms ”, i.e. four temperature ranges as narrow as possible, by mixing four liquid crystal slurries in the experimental fluid, in the proportion of 0.1g/L each, and illuminating the solution with a laser sheet from a compact solid-state diode-pumped, laser, emitting a single-frequency green at 532 nm. Images were taken with a black and white CCD and the temperature precision reached 1%. This technique can be used in combination with PIV to obtain also the velocity field and with fluoreceine markers to obtain the compositional field.

Anne Davaille  
LDSG, IPG Paris

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