

Influence of skin formation on thermal convection

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We have investigated the characteristics of thermal convection in micelle-based viscous fluids. The rigid bottom of the experimental tank was heated from below while its upper free surface was cooled from above in a climatic chamber. The latter also allows to maintain a constant humidity. Micelle-based fluid crystallizes at low temperature (ductile solid), and is Newtonian at high temperature. Top and bottom temperatures were chosen so that during an experiment, crystallization of the upper surface occurs, forming therefore a thin skin. The thermal and velocity structures were visualized using liquid crystals and Particle Image Velocimetry. Preliminary results at low Rayleigh numbers ($Ra \sim 10^4$) show a moving upper surface and asymmetric convection patterns.