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Solidification and natural convection in a Hele-Shaw cell
EDUARDO RAMOS, GUILLERMO RAMIREZ, JONATHAN CISNEROS, GUILLERMO HERNANDEZ-CRUZ, Universidad Nacional Autonoma de Mexico
— Water solidification in presence of natural convection has been experimentally observed in a Hele-Shaw cell. Initially, the cell is filled with liquid water, and the upper and lower horizontal walls are kept at -10 °C and 25 °C respectively. The water starts to solidify near the upper wall and a solidification front advances downwards. The unstable temperature gradient triggers natural convection in the liquid filled region of the cell (where thermal and geometrical conditions lead a Rayleigh number larger tan critical). As the solidification front moves and its distance to the lower wall reduces, the Rayleigh number diminishes below the critical value and natural convection stops. The motion of the front and the natural convection motion are recorded with a video camera and measured with image processing and PIV respectively.

Eduardo Ramos
Universidad Nacional Autonoma de Mexico

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