# Buoyancy and surface tension driven convection around a bubble

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A combined experimental and numerical analysis has been carried out to study the behavior of a bubble under a horizontal heated surface. In this configuration, the interaction between buoyancy and surface tension driven convection produces complex fluid dynamic structures. An instability occurs in the form of an oscillatory three-dimensional fluctuation of the thermal and velocity field when a critical temperature difference is exceeded. The structure of this flow regime has been investigated with transient three-dimensional simulations carried out for normal gravity and zero gravity conditions. The velocity field around the bubble has been experimentally analyzed with a ``laser sheet'' technique for the flow visualization and a Wollaston prism interferometer has been utilized to capture the oscillatory temperature field. Good correlations are shown between experimental and numerical results.

Keywords: Thermal convection, Buoyancy-driven instabilities, Surface-tension-driven instability, Interactions with surfaces, Morphological instability; phase changes, Computational methods in fluid dynamics
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