Pattern formation in the longwave Marangoni instability of a binary liquid with the Soret effect

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The longwave Marangoni instability in a binary-liquid (mixture of two species) film with the Soret effect (thermodiffusion) is discussed.
Both monotonic and oscillatory instabilities attributed solely to the presence of the Soret effect are found in the case of a finite heat transfer rate at the liquid-gas interface. A set of nonlinear partial differential equations of evolution type describing the spatiotemporal dynamics of the film thickness and the solute concentration in the oscillatory regime is derived. Weakly nonlinear analysis in the case of the oscillatory instability based on these evolution equations shows the emergence of several kinds of stable supercritical standing and traveling waves along with superposition of two traveling waves propagating at a certain angle in various parameter domains.