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**The coupling of gravity waves and convection: Amplitude equations and planform selection.**

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Summary: Convective motion in a layer of fluid heated from below is considered where the boundaries are stress free and the upper surface supports interfacial gravity waves. Inviscid, immiscible, constant density, ambient fluid is separated from the convecting layer below by a stable density jump. An important parameter in the problem is $\delta$ representing the ratio of the interfacial density jump to the density change across the convecting layer. Amplitude equations are derived describing convective motion in the plane, and a planform selection analysis is performed. It is demonstrated that the breaking of the translational and Galilean invariance of the problem allows a strong coupling between a large-scale interfacial mode and convection. The resulting phase dynamics is third order in time.

**MSC:**

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|---|---|---|
| 76E15 | Absolute and convective instability and stability in hydrodynamic stability | Cited in **2** Documents |
| 76E30 | Nonlinear effects in hydrodynamic stability | |
| 76R10 | Free convection | |
| 76D33 | Waves for incompressible viscous fluids | |

**Keywords:**

density jump; Galilean invariance; large-scale interfacial mode; phase dynamics

**Full Text:** DOI

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